Democracies under rising inequality: New tests of the redistributive thesis

Manuscript committee: Prof.dr. B.J.P. van Bavel
Prof.dr. J.A. Bikker
Prof.dr. K. Heitzmann
Prof.dr. J.J. Schippers
Prof.dr. E. Stam

Democracies under rising inequality: New tests of the redistributive thesis

Groeiende inkomensongelijkheid in democratieën: De herverdelingsthese getoetst
(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor
aan de Universiteit Utrecht
op gezag van de rector magnificus,
prof.dr. G.J. van der Zwaan,
ingevolge het besluit van het college voor promoties
in het openbaar te verdedigen op
vrijdag 24 februari 2017 des middags te 2.30 uur

door

Daan Ernst van der Linde
geboren op 5 juni 1988 te 's-Gravenhage

Promotor: Prof.dr. B. Unger
Copromotor: Dr. L.F.M. Groot

Voor mijn ouders

Acknowledgements

While this dissertation carries only my name, it would not have been possible to write without the contributions, insights, help and distractions offered by those whom I have been lucky to have come to know in recent years and those who I have known for most and all my life.

I firstly gratefully acknowledge the Wirtschafts- und Sozialwissenschaftliches Institut (WSI) in the Hans-Böckler-Stiftung (HBS) for their generous financing of the WSI-EUCOS (European Comparative Studies) PhD project at Utrecht University School of Economics (U.S.E.). In particular, I thank the initiators Michael Sommer and Dr. h.c. Nikolaus Simon and their successors Reiner Hoffmann and Michael Guggemos for supporting this study on income inequality.

I owe a great deal to my promotor Brigitte Unger, hiring me first as a student assistant and later as a PhD student. Brigitte gave me the freedom to pursue my own academic interests and encouraged me along all the byroads which ultimately led me to this dissertation, for which I am grateful. Brigitte is a true egalitarian, which shows in both her academic work and her willingness to share. I hold good memories of the projects we worked on together, the most notable among them perhaps being the workshops held in the beautiful surroundings of Florence at the EUI.

This dissertation would also not have been possible without the support of Loek Groot. Loek's rigour and patience helped shape my papers tremendously. I was always happy to be able to pass by your office and discuss ideas. Loek is an academic omnivore and able to write about a broad range of topics. Although he always advised me to specialize, he is an example for me in this sense.

I would also like to thank the members of my reading committee, Bas van Bavel, Jaap Bikker, Karin Heitzmann, Joop Schippers and Erik Stam, for their time and comments on my work. All committee members are authorities in their fields, and I am honoured to have them in my committee. My earlier collaboration with Jaap Bikker in other work was a tremendous help for both my STATA and publishing, but also my birding skills.

Utrecht University School of Economics provided me with the right environment for this work, promoting multidisciplinary economic research that acknowledges the important role of institutions in understanding and explaining economic dynamics. My thanks go out to all other members of the chair of Economics of the Public Sector at U.S.E., with whom I worked closely over the years, especially Ioana, Joras, and Maryam.

I am glad to have shared this journey with some other close colleagues at U.S.E.. I was fortunate enough to start this project together with my fellow EUCOS-WSI colleagues Ian and

Swantje, with whom I was happy to co-author, co-travel and co-move across offices. I also thank my other former roommates Jaap, Malka, and Milena, further into the building An, Joyce, Krista and Werner, and all other colleagues for inspiring discussions over lunch, dinner and drinks.

The fourth chapter in this dissertation revolves around the idea that many advantages are transmitted from one generation to the other. In this sense, I could not be more privileged, and am grateful to my own parents, Sandra and Leo, for all their support throughout and before. I of course also greatly benefitted from *intra*generational transmissions, Max!

I will not be the first *doctor* in the family. Only years after his untimely passing in 2011 did we realize my uncle David, who was a scholar of the classics at the University of Cincinnati by day, also was a leading authority on nineteenth century professional baseball, posthumously lauded for his work in a gathering of hundreds of baseball scholars in Chicago in 2015. I can only ever hope my work would bring out such a crowd.

Most importantly, my final word of gratitude goes out to Suze. While I had the privilege of working on this dissertation all day, Suze used her evenings alongside me to work on her own academic career. I am unbelievably proud of what you have been able to accomplish, and thankful for all the support you gave and give me. *Bedankt dat je jouw leven met mij wilt delen!*

Daan van der Linde
Utrecht, December 2016

Table of Contents

List of figures

List of tables

'There is no Say's Law in Politics' (Cusack et al. 2006: 369)

Chapter 1: **Introduction**[1]

Throughout a majority of developed economies income differences are widening. Given these growing disparities, Bonica et al. (2013: 103) have recently put forth the question why democracies were unable to halt this trend. The premise underlying this question is that political equality in democracies holds economic inequality in check. In light of expectations that the future will bring further increases in income inequality (Piketty 2014; Freeman 2015), this question will become ever more pressing.

The *redistributive thesis* offers a theory linking democracy and inequality[2]. It asserts in democracies a majority of voters which become (relatively) less well off as inequality grows will favor taxes and transfers, the proceeds of which are directed downward (Shapiro 2002). The higher the inequality, the greater these resulting redistributive efforts are expected to be. There is however 'no Say's Law in politics' (Cusack et al. 2006: 369), implying these redistributive policies are not some automated result of democracies calibrating demand and supply. Rather, the shaping of modern day welfare states is a complicated and political process, contingent on economic, historical and institutional factors which all mediate societal demands. In this dissertation, I set out to offer new tests of the redistributive thesis to achieve an understanding of the great variation maintained across welfare states regarding their redistributive policies. Such an understanding can help establish patterns of redistributive policies across nations and shed light on the political causes and consequences of inequality.

In this introduction, I lay out the framework this dissertation offers to measure, compare and evaluate different welfare state constellations. A method to measure the extent to which nations redistribute income is proposed. This method both allows to test theoretical expectations derived from the *redistributive thesis* and to confront nations' tax-and-transfer schemes with specific conceptions of distributive justice.

1. Redistribution and Insurance

Political accounts of the welfare state view redistribution of income as the realization of collective choice resulting from a tension between two conflicting principles of democratic market economies: efficiency and equality. While the labor market characterized by a large

---

[1] This introduction is in part based on a forthcoming book chapter in Unger, B., D. van der Linde and Getzner, M. (Eds.): Public or Private Goods? Redefining Res Publica. Edward Elgar, Cheltenham (forthcoming).
[2] In economic literature, this *redistributive thesis* has been put forth by Romer (1975), Roberts (1977), and Meltzer and Richard (1981) among others.

division of labor operates according to marginal productivity, democratic principles rather operate according to 'social need, or entitlement, as certified by the collective choices of democratic politics' (Streeck 2011: 3). The Second Fundamental Theorem of Welfare Economics shows that only under very restrictive conditions of complete markets and 'incentive-neutral' lump-sum transfers this tension be resolved and market and democratic forces can jointly operate. Given the impossibility of either condition, governments face trade-offs, as failing 'to attend to democratic claims for protection and redistribution [they] risk losing their majority while governments that disregard the claims for compensation (…) cause economic dysfunctions and distortions that will be increasingly unsustainable and will thereby also undermine political support' (Streeck 2011: 3).

While one may thus conceive redistributive policies as the realization of collective choice trading equality against efficiency (cf. Okun 1975), economic theory has put a different case justifying public intervention in the income distribution. Apart from a redistributing function, specific social policies rather also provide mechanisms to share major career and life risks and thereby offer insurances which markets generally cannot provide. Private insurance markets fail to cover such risks, as generally once individuals reach an insurable age, the 'dice have already been cast' (Sinn 2003: 68), and those belonging to the so-called 'good' or low-risk group will not want to participate in any private insurance scheme, while the 'bad' risks will want to do so. This drives up the price of insurance, moving a new group of relatively low risk individuals to opt out of the insurance, etc., ultimately leading a market to unravel. As such inborn differences hinder individuals to sufficiently insure major life and career risks in the market sphere, governments can fulfill the demand for such insurance services. Drèze (1993: 166) concludes redistribution of income from high- to low-skilled individuals hence 'could be viewed as risk-sharing among unborn individuals uncertain about their native skills'.[3] Such reasoning can explain many of the labor market policies we observe around the world, as well other types of social insurances, which similarly cover risks for which any private insurance policy would be plagued by large uncertainty, moral hazard problems and information asymmetries. Taken more broadly, even progressive taxation has been suggested to form a type of publicly provided insurance (Varian 1980).

Redistribution and insurance hence form two sides of the same coin, where 'ex post, every insurance contract implies redistribution from the lucky to the unlucky' (Sinn 2003: 66), implying ex ante many redistributive government activities can be interpreted as insurance

---

[3] A notion similar to that found in Rawls' (1971) 'original position', where participants reflect on society deprived of information about their characteristics—i.e. 'unborn' (a point also made by Barr 1992)

policies. Most public policies redistributing income are an implicit mixture of both ex ante efficient insurance schemes and ex post redistributive transfers (Drèze 1993). Both elements furthermore inherently counteract, where improved risk-sharing mechanisms reduce the urge for corrective redistribution, while their 'absence reinforces that urge' (ibid.: 166).

2. Explaining Patterns of Redistribution: Some challenges

Widely different national constellations of tax-and-transfer systems pose a problem for comparative research into the redistribution of income. As social programs, tax rates and their progressivity, as well as tax laws and deductions greatly differ among nations, any attempt at aggregation clearly comes at the cost of losing information on the specificities of these programs and their historical evolution. On the other hand, aggregation of policies and their impact on the income distribution aids in the comparability of very different countries, allows for more general inferences and allows identifying deviant cases, warranting further research (for a discussion, see Landman 2003). While both approaches clearly have their merits, this dissertation offers a simplified framework to assess the redistributive impact of governments across nations in a highly comparable fashion.

Figure 1-1 gives the cross-national variation among OECD nations in what is termed market, gross or 'pre-fisc' income inequality and what is termed disposable, net or 'post-fisc' income inequality, measured by the Gini coefficient. Market income includes wage and salary income or self-employment income, private (occupational) pension income, as well as income from capital and property, such as dividend, interest or rents. Post-fisc income is the net of gross income and social security transfers, allowances and other benefits after subtracting direct tax payments and social security contributions. Redistributive policies are the joint result of those policies translating pre to post-fisc income.

Chapters of this dissertation focus on three countries: The Netherlands, Germany and the United Kingdom. They are firstly interesting as they each represent a different type of welfare state (Esping-Andersen 1990, for a discussion, see Arts and Gelissen 2002). The United Kingdom belongs to the *liberal* welfare state type, championing economic growth and efficiency, and designing its social programs to avoid work disincentives and welfare dependency. Germany fits the prototype *corporatist* regime, which aims at social stability and social integration, with occupational social insurance as its predominant transfer program, focusing on the position of breadwinners, contingent on the occurrence of unemployment, disability and sickness. The Netherlands is usually classified as belonging to the *social democratic* regime, which gives priority to minimizing poverty, income inequality and

unemployment, and largely uses tax-financed universal benefits and active labor market policies. Figure 1-1 furthermore shows that the three countries each show similarities and differences regarding gross and net income inequality. In gross terms, the United Kingdom resembles Germany, while both countries are quite different from the Netherlands. Germany however manages to reduce income inequality in net terms to a far greater extent than the United Kingdom, effectively bringing it down to levels similar to those found for the Netherlands, implying the United Kingdom stands out in terms of net income inequality.

Data from OECD (2015)
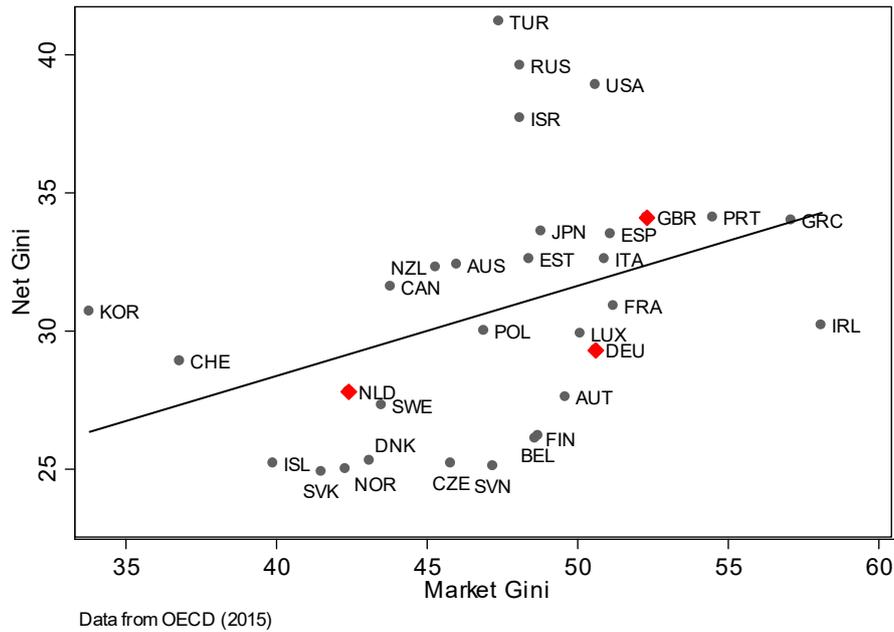
Figure 1-1: Market and net income inequality between 2009-2012

The point of departure to measure the extent to which policies translate pre to post-fisc income is an assumption of a tax-and-transfer system based on a proportional tax rate t on income from which lump sum transfers c are transferred to everyone. In addition, government uses collective resources for public good spending of g per capita. This assumption of an affine tax policy that can describe a myriad of real life policies is widely used in the literature, and empirically has been shown to adequately describe different tax-and-transfer systems (see e.g. Roemer et al. 2003). Figure 1-2 illustrates the method for Germany in 2012 (data from SOEP 2014), assessing a linear relationship between (equivalized) gross and net incomes. The implicit tax rate t is given by one minus the slope of the bold regression line, while the intercept with the vertical axis gives the implied lump transfer amount c. The difference between mean gross income $\bar{x}$ and mean net income $\bar{y}$ informs us of the amount spent on public goods g per capita, also denoted in Figure 1-2.
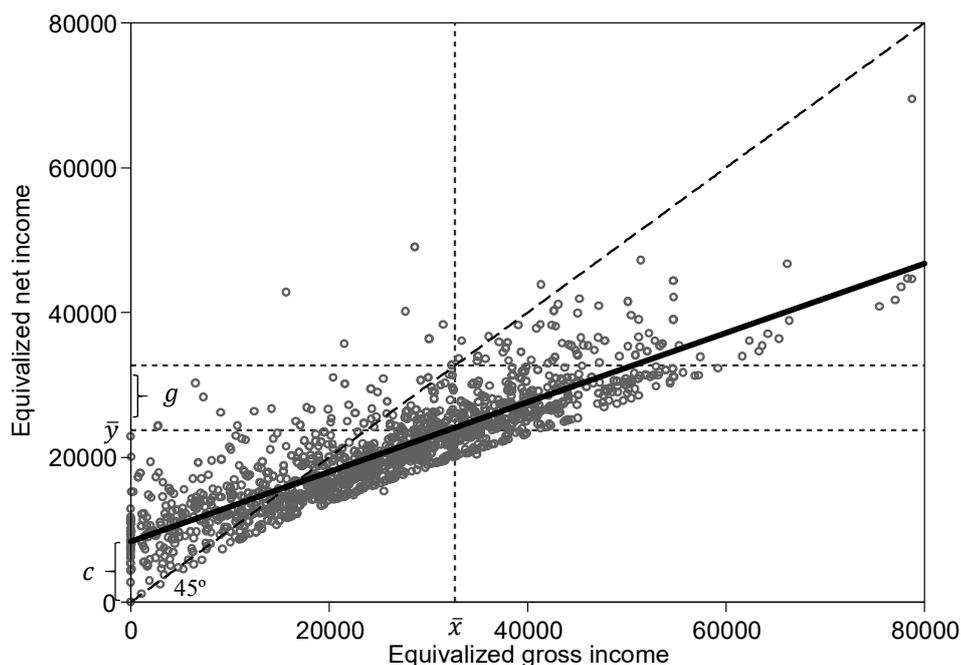
Figure 1-2: Assessing taxes and transfers for Germany (2012) using micro-level data

The *redistributive thesis* explains the variety in combinations of (t, c) across democratic nations in the following way: the more skewed the income distribution becomes, the worse off a majority of voters becomes (at least in relative terms), resulting in greater pressure for redistributive policies. Responsive democracies in this case serve as a stabilizer of income inequality. More specifically, this result holds under Downsian-type political competition within a one-dimensional policy space, where parties are expected to shift their manifestos to the median voter's preferred policies to win elections. Hinging on this Median Voter Theorem (MVT), parties support more redistribution, the greater the dispersion of wages or income becomes, as with growing inequality the median voter is further removed from the mean earner.

This account linking income inequality and redistribution, mediated by the political process, should be first and foremost judged on its empirical track record. Lindert's (2004) historical analysis of welfare spending finds strong evidence for a relationship between franchise and redistribution. Although the spread of franchise, Lindert (2004: 71) suggests, is not a sufficient explanation for the policy changes, 'it may be a necessary one, in the sense that it will become increasingly difficult to explain the broader patterns without assigning any significant role to changes in political voice'. Poor relief existed in early 'elite-democracies' in which political voice was held exclusively by labor-hiring property owners, instated to prevent exit of local labor markets and maximize the supply of labor (Boyer 1990). Extension of political voice to the self-employed middle class caused a stagnation in poor relief, as this group

had less interest in poor relief relative to other social programs (e.g. pensions or schools). As voting rights however were extended to lower income groups, support for social spending increased sharply, and led to the 'return of Robin Hood', where 'increasingly powerful lower-income groups demand progressive redistribution' (Lindert 2004: 81). Piketty (2014: 424) also touches on the effects of the extension of voting rights, and suggests its role to be more limited. Although in his words the transition of property qualifications for voting to universal suffrage ended the legal domination of politics by the wealthy, 'it did not abolish the economic forces capable of producing a society of rentiers'. More recently, within certain countries evidence for the redistributive thesis appears to be weak, as certain democracies have been unable to curb rising levels of income and wealth inequality (e.g. Bonica et al. 2013).

The empirical uncertainty facing the *redistributive thesis* poses a challenging theoretical problem, touched upon in chapters of this dissertation. It firstly may be the case that while democracies are generally responsive to political demands, we cannot adequately capture voters' preferences. It may however also be the case that while we can capture voters' preferences, our accounts of the democratic process are too much of an ideal-type, offering an oversimplified account of the political process. Any understanding of redistributive politics requires an understanding of the formation of redistributive preferences, as well as an understanding of the political process that channels those preferences into policies. The separate chapters of this dissertation address both these aspects, judging both the validity of the MVT and that of commonly specified ways to capture voters' political preferences.

3. Outline of the dissertation

As suggested above, the type of political process necessary for the *redistributive thesis* to hold may represent an ideal type. Rather than the 'one-person-one-vote' promise of a democracy, political *voice* may be unevenly distributed, skewing influence over the political process. Certain institutions may hamper the accountability of elected officials to the majority (Bonica et al. 2013), while outcomes among multiparty systems with proportional representation may differ compared to countries with majoritarian electoral systems (Austen-Smith 2000). Finally, nation states may be constrained over time, where international political and economic developments may influence the scope for action. Liberalization and increased factor mobility may cause a downward pressure on the capacity to tax income, limiting countries' 'room for maneuver' (Unger 1998).

Chapter 2 offers a new test in a cross national context to assess the *redistributive thesis'* expectation that inequality pressures democracies to increase their redistributive efforts. It

builds upon an assumption about the shape of the income distribution. If gross income is lognormally distributed, using only the net and gross Gini figures measuring income inequality from Figure 1-1, it is possible to derive an implied tax rate and transfer amount. This innovation to the literature is promising, as it requires far less (detailed) data compared to previous studies. Aside from innovations in the method, it is the first contribution to give a precisely identify the decisive voter, yielding the *Median Voter Deviation*, representing the distance between the decisive and median voter, potentially indicative of skewed voter turnout or unevenly distributed political voice

For the *redistributive thesis* to hold, voting behavior must be driven by self-interest. This view dominant in the economic literature suggests individuals at the bottom ranks of the income distribution stand to gain from redistributive programs, and hence vote in favor of more income equality, while those in the upper ranks stand to lose, and vote in favor of less equality. Objections against the expected behavior of voters under the *redistributive thesis* are generally threefold. We firstly may believe voting to be a rational choice, yet argue individuals are only rational in a bounded sense, making their electoral choices under imperfect information. Voters for instance generally lack detailed information on the income distribution or their place in it. Secondly, as argued above, social insurances and redistributive programs interact, and insurance motives may exist apart from purely redistributive motives, implying redistributive preferences relate to one's income position in a less clear cut fashion. Finally, some feel voting behavior cannot adequately be captured by self-interest, and rather is based at least in part on other-regarding preferences, altruistic motives, or beliefs regarding the role of effort and luck in explaining income differences (see e.g. Piketty 1995; Fong 2001).

Chapter 3 exploits informational imperfections about one's location in the income distribution to study the formation of redistributive preferences. If electoral choices are indeed based on a rational weighing of costs and benefits of increased taxation to fund redistributive expenditures, it must be one's perceived (and thus known) location rather than one's actual (and unknown in the case of over- or underestimation) location that drives one's preferences. Assessing whether individuals who over- or underestimate their location in the income distribution vote differently shines a light on the question whether we can adhere to a self-interested model of voting behavior.

Both Chapter 4 and Chapter 5 make use of British and German micro data. Chapter 5 assesses whether insurance motives exist apart from redistributive motives explored in Chapter 3. As insurance motives may be shared more broadly among the electorate (Moene and Wallerstein 2001), this may imply the link between income position and political behavior is

less clear cut. Chapter 5 exploits longitudinal variation in sectoral unemployment in order to assess this dynamic, seeking to find whether and how job insecurity affects party support. Independent of income position, workers experiencing job insecurity are thought to be more likely to pressure governments to increase or maintain social protection schemes.

Redistribution can be viewed as an outcome of a democratic polity under the *redistributive thesis*, as in Chapter 2, but can also be compared to a specific conception of distributive justice, as in Chapter 4. This chapter uses micro-level data, as used in Figure 1-2, combining figures on gross and net income to derive these implied tax rates and transfer amounts for the United Kingdom, the Netherlands and Germany. This method requires far more data, yet is not dependent on assumptions regarding the distribution of gross income. Chapter 4 assesses how observed tax-and-transfer systems weigh up against tax-and-transfer systems justifiable under equality of opportunity (EOp).

Recent developments in political theory regarding social justice have shifted focus from equality of outcomes to EOp. The key feature of such responsibility-sensitive egalitarian theories is the idea that in an equitable society all citizens have equal opportunities to attain the outcomes they care about. Following EOp, fiscal policies should redress those inequalities resulting from circumstances beyond the individual's control, such as one's (parental) background. Voting decisions may not capture merely the rational calculation of the costs and benefits of increased taxation, but may also include such beliefs about distributive justice and the role of effort and luck in explaining income differences.

Tax-and-transfer schemes are only one among a number of ways to intervene in the income distribution. Chapter 6 explores another avenue, giving an example of a policy able to 'predistribute' income (Hacker 2011), i.e. reducing income differentials before taxation. Such policies are promising as given the *redistributive thesis* they decrease the need for redistributive tax-and-transfer programs, and if well designed perhaps in addition even offer economic gains, offering productivity-enhancing redistribution of wealth (Bowles 2012) and directions along which equality can increase along with an efficiency gain (Putterman et al. 1998). The specific question Chapter 6 addresses is why, given Samuelson's (1957) equivalence between capital hiring labor or labor hiring capital, we so hardly observe the latter in firms. A novel argument is further developed, studying potential collective action problems in the start-up phase of these types of firms, and demonstrate which specific types subsidies, if warranted, may relieve them.

Chapter 2: **Income Inequality, Redistribution and the Position of the Decisive Voter[4]**

Abstract: A large literature explaining patterns of redistribution makes use of the median voter theorem. Using a novel approach, this contribution shows that in OECD countries the decisive voter, determined by the earner who sees her preferred tax rate being implemented, on average sits around the 50th percentile in the income distribution, although significant differences within countries over time and between countries exist. Under the assumption of a lognormal distribution of gross income, we derive the required tax rate to align the observed gross and net Gini coefficients in OECD countries. This estimated tax rate is compared to the tax rate preferred by the median income earner, which gives a new index capturing a nation's deviation from the median voter position, measured as the difference between the estimated percentile position of the decisive voter and the 50th percentile position of the median voter. We provide a comparative overview of this index over time and between countries. We also locate the positions of alternative versions of the decisive voter, among which following the 'one dollar, one vote' rule, in a Lorenz curve diagram.

1. Introduction

Rising levels of income and wealth inequality have recently led a number of authors to wonder why democracies have been unable to stall this process (e.g. Bonica et al. 2013). Piketty (2014, chapters 10 and 14) mentions that despite being a democracy, the Third Republic of France did not do much to curb rising inequality in the period before WWI. Standard economic models invoking the median voter theorem (henceforth MVT) predict rising inequality will be met with increased redistribution, yet faced with empirical evidence questioning this relation, recent work (e.g. the survey by Harms and Zink 2003) has put forth arguments claiming the political process may be skewed in favor of special interest groups (i.e. 'one-dollar-one-vote', Karabarbounis 2011) or distorted by institutions hampering the accountability of elected officials to the majority. Mettler (2011) claims information shortages hamper the translation of economic realities into political demands, whereas Mahler (2008) and Arawatari (2009) argue that skewed and decreasing voter turnout affect the representativeness of the electorate. Finally, multi-dimensional party manifestos, logrolling and coalition formation may give rise to deviations from the median voter rule.

The aim of this contribution is to locate the decisive voter in the income distribution in OECD nations. Using a new method, under a number of basic assumptions we show where in the income distribution the decisive voter sits. In our analysis, the decisive voter must be interpreted as the income earner who sees her most preferred tax rate being realized. Our approach builds on earlier work testing the validity of median voter theory, yet gives a more precise definition of the decisive voter compared to previous studies (see e.g. Scervini 2012

---

who classifies the median voter as in between to 40th and 60th percentile in the income distribution). Moreover, our positioning of the decisive voter is based on widely used data.

Our point of departure are the Gini coefficients for gross and net incomes from the OECD Income Distribution database (OECD 2015), which cover 32 countries for the period 1974–2012. If gross income is lognormally distributed, the country and year specific parameters of the lognormal distribution of income can be derived from the Gini coefficients and GDP per capita. We derive the optimal labor supply using the methodology from Roemer et al. (2003), giving the distribution of wages and labor supply and the formula for the tax rate and the lump sum transfer. We show that the preferred proportional tax rate is dependent on one's earnings capacity and identify the decisive voter as the one whose preferred tax rate is equal to the empirically estimated tax rate. Given the derived distribution for wages, we can locate the percentile position of the decisive voter. We find the decisive voter sits on average around the 50th percentile in the income distribution, with significant differences within and between countries.[5] We provide a comparative overview of these differences and pitch our outcomes against the predictions made by the MVT.

Assessing the position of the decisive voter in the income distribution requires a theoretical framework which is able to derive preferences for taxation, taking into account heterogeneity in wages and labor supply disincentives of taxes and transfers. Our approach is in line with the MVT subsumed under the Romer-Roberts-Meltzer-Richard model (henceforth RRMR, see Meltzer and Richard 1981), in which rising inequality in gross income increases the distance between the median earner and mean earner, increasing the desired level of redistribution by the median voter. This mechanism steers how changes in gross income inequality translate into net income inequality. According to the MVT, the decisive voter or median voter is the median earner under the assumptions that policy alternatives can be situated along a one-dimensional political spectrum and that voters themselves have single-peaked preferences. Since we focus only on the gross and net income distribution, the mediating tax-and-transfer system is in line with a one-dimension policy space in which voters have single-peaked preferences with respect to the parameters of the tax-and-transfer system.

Our approach has advantages and limitations. The most important advantage is that using only easily accessible statistics such as Gini coefficients, GDP per capita and government consumption as a share of GDP, our model provides an estimate of the position of the decisive

---

[5] We applied the same model to the more comprehensive SWIID database and found that the decisive voter on average sits at the 60th percentile. However, as Jenkins (2015) has convincingly shown and two referees remarked, there are serious shortcomings in using the SWIID database for our purposes, particularly because of the imputation of Gini coefficients for (mostly) developing countries for which data are missing.

voter. Second, we provide a way to include in-kind, non-cash public provision of goods such as public education in the model as one component of redistribution, alongside cash transfers. Third, we can precisely locate several hypothetical decisive voters in a Lorenz curve diagram, e.g. if the 'one dollar, one vote' rule applies, or the 'one man, one vote' rule, or when voters are myopic, solely focusing on net income and disregarding the disutility of labor. There are also some limitations to our approach. First, due to data limitations, we use the same labor supply elasticity for all OECD countries. With better data, for instance micro data including wage rates and working hours, the labor supply elasticity can be estimated for specific countries and years. Second, our assumption that gross income is lognormally distributed does not adequately describe the distribution of income at the right tail of high incomes (Singh and Maddala 1976). Although we are aware that the lognormality assumption has its limitations, it must be said that the high incomes are generally also underrepresented in surveys. A more serious shortcoming is that because the parameters of the lognormal distributions are derived from GDP per capita and the net and gross Gini coefficients, the resulting gross and net income distributions will be imperfectly mimicking the real distributions at the lower end of the income distribution.[6] The assumption of lognormality to model the income distribution is frequently made, e.g. by Chotikapanich et al. (1997), Dikhanov and Ward (2001), Pinkovskiy and Sala-i-Martin (2009) and Van Zanden et al. (2013). Third, we assume the tax-and-transfer system can be described by the combination of a flat earnings tax and a uniform lump sum grant, while in reality there are a variety of taxes, ranging from wealth to capital income, VAT and excise taxes with differentiated rates, and a variety of welfare benefits, ranging from social assistance to housing benefits. Although capital income as part of GDP per capita is included in our parameter estimation, we abstract from capital (income) in our analytical model. Fourth, our estimates pertain only to countries generally classified as democratic, while results may differ for non-democratic nations which are not subject to the constraint that 'one man, one vote' has on the outcomes of the political process. Our findings are however indicative of the fact that even in these democratic nations the median income earner does not always coincide with the voter who sees her preferred level of redistributive taxation being realized.

This paper is organized as follows: Section 2 presents our theoretical model and the relation between preferred tax rates and wages. Section 3 provides information about the data used, the derivation of the lognormal distributions, the estimation of parameters and the analytical expressions of the percentile position of the decisive voter. We also provide a Lorenz

---

[6] For instance, due to statutory minimum wages and the prevailing social benefit levels, there will be many more incomes at just these income levels than under the lognormal distributions.

curve diagram with the positions of the mean and median earners and several decisive voter positions depending on whether 'one man, one vote' or 'one dollar, one vote' applies. Section 4 contains the results. The final section summarizes and concludes.

2. Theoretical framework

As is customary in the public economics literature, e.g. in the seminal article of Meltzer and Richard (1981), we model tax-and-transfer schemes by a proportional tax with tax rate t and transfers f. While in reality tax and social security systems are complex, Roemer et al. (2003: 553) show for a subset of countries similar to ours such an assumption of affineness is suitable, as it 'is a very good description of the effective tax regime data for all the countries that we examine'. We assume f consists of both a lump sum income transfer component c and a public good component g. Heterogeneity is achieved by allowing individuals' wage rate (w) and labor supply (L) to differ. We use the same utility function as in Roemer et al. (2003), where utility is increasing in net disposable income (y) and decreasing in labor supply:

$$U(y, L) = y - \alpha L^{1+1/\eta} \tag{1}$$

with η the wage elasticity of labor supply and α the parameter reflecting the disutility of labor. Maximizing utility given the budget constraint $y = (1 - t)wL + c$, optimal labor supply is:

$$L^* = \left[\frac{(1-t)w}{\hat{\alpha}} \right]^{\eta} \tag{2}$$

with $\hat{\alpha} = \alpha(1 + 1/\eta)$. We assume a balanced budget implying $f = t\bar{x}$, with $\bar{x}$ representing mean gross income, which using (2) can be stated as:

$$c + g = t \int wL^* dF = t \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \int w^{1+\eta} dF = t \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \overline{w^{1+\eta}} \tag{3}$$

so that the lump sum income transfer can be expressed as $c = t \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \overline{w^{1+\eta}} - g$. The revenue-maximizing tax rate $t^{\max}$, which is optimal from a Rawlsian social justice perspective,[7] is the one that maximizes f (or c, if g is exogenous). Maximizing (3) with respect to t gives $t^{\max} = 1/(1 + \eta)$.

To find the preferred tax rate t_i of an individual with wage rate w_i, given the government balanced budget constraint, the indirect utility function, obtained by substituting (2) and (3) into (1), is differentiated with respect to t. This gives the relation between one's preferred tax rate and one's earnings capacity:

---

[7] It is the preferred tax rate for those with zero earning capacity, because it maximizes the lump sum transfer.

$$t_i = \frac{w_i^{1+\eta} - \overline{w^{1+\eta}}}{w_i^{1+\eta} - (1+\eta)\overline{w^{1+\eta}}} \tag{4}$$

depicted in Figure 2-1, for different labor supply elasticities. For higher values of η, the revenue maximizing tax rate $1/(1+\eta)$ shifts to the left. Since the preferred tax rate is positive for all those with earning capacity $w_i^{1+\eta}$ below $\overline{w^{1+\eta}}$, the median wage earner $w_m^{1+\eta} < \overline{w^{1+\eta}}$ will choose a positive tax rate, which is higher, the lower the labor supply elasticity.
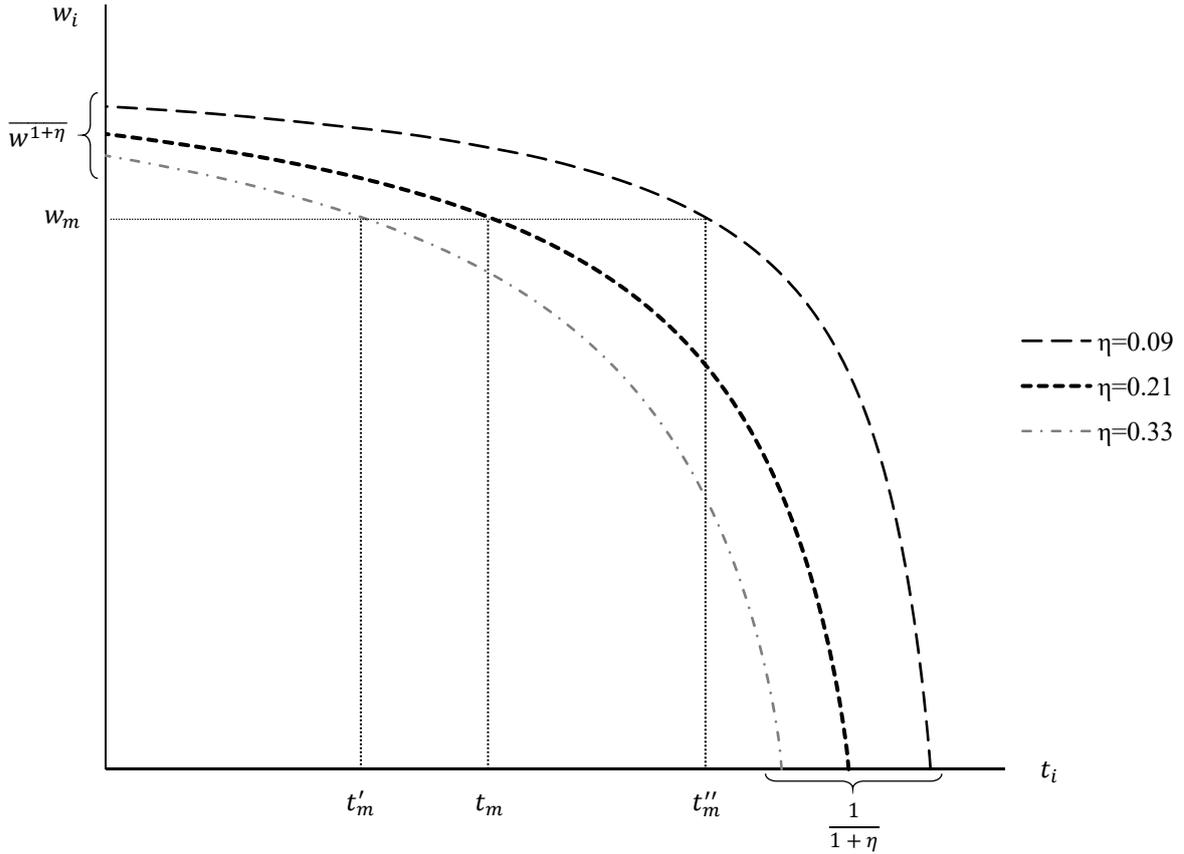
Figure 2-1: The relationship between the preferred tax rate and earnings capacity.

Using (4), as the first derivative of t with respect to w is negative, the higher one's wage rate becomes, the lower the preferred tax rate will be. The first derivative of t with respect to $\overline{w^{1+\eta}}$ is positive, so given one's wage rate, the higher the wages economy-wide, the higher the tax rate chosen. The tax rate t_m preferred by the median earner with w_m is:

$$t_m = \frac{w_m^{1+\eta} - \overline{w^{1+\eta}}}{w_m^{1+\eta} - (1+\eta)\overline{w^{1+\eta}}} \tag{5}$$

We can rewrite (4), giving the wage rate as a function of the preferred tax rate:

$$w_i = \left[\frac{1 - t_i(1+\eta)}{(1-t_i)}\overline{w^{1+\eta}}\right]^{\frac{1}{1+\eta}} \tag{6}$$

Inserting our estimates of tax rates $\hat{t}$ that align observed country- and year-specific gross and net Gini coefficients in (6) allows us to identify the decisive wage earner with wage rate $\widehat{w}_D$:

$$\widehat{w}_D = \left[\frac{1 - \hat{t}(1 + \eta)}{(1 - \hat{t})} \overline{w^{1+\eta}}\right]^{\frac{1}{1+\eta}} \tag{7}$$

In the introduction, we already gave a limitative list of reasons why the observed tax rate may diverge from the one expected under MVT. Here we want to add another possibility, namely that the voter is not maximizing utility U but net income y, which analogous to (5) and (6) results in a preferred tax rate:

$$t'_i = \frac{(1 + \eta)w_i^{1+\eta} - \overline{w^{1+\eta}}}{(1 + \eta)(w_i^{1+\eta} - \overline{w^{1+\eta}})} \tag{8}$$

and

$$\widehat{w}'_D = \left[\frac{1 - \hat{t}(1 + \eta)}{(1 - \hat{t})(1 + \eta)} \overline{w^{1+\eta}}\right]^{\frac{1}{1+\eta}} \tag{9}$$

Since the ratio $\widehat{w}'_D(\hat{t})/\widehat{w}_D(\hat{t})$ is below unity, the percentile position of this 'myopic' decisive voter, denoted by P_y, in the income distribution will thus be lower than P, corresponding to the percentile position of $\widehat{w}_D$ (see also Figure 2-2 below).

3. Data and method

In order to locate the decisive voter $\widehat{w}_D$ by country and year, we need information on the wage distribution and imposed tax rate in a country. We assume that income follows a lognormal distribution. Compared to more complex distributions with two or more parameters, the lognormality assumption may bias our estimates of both mean income and dispersion of income upwards (McDonald 1984). Combining data from the OECD Income Distribution database (OECD 2015) on market or gross income Gini coefficients[8] (G) and post-tax-and-transfer or net Gini (G_n) with GDP per capita (in current international dollars at PPP) data from the World Bank (2015), we can estimate the parameters of the lognormal distribution of gross and net income. For cases with missing data for GDP or population, we standardize GDP per capita to 1000.[9]

---

[8] Our gross and net Gini measures are based on household market and disposable income per equivalent household member, according to the 2011 income definition, adjusting income by the square root of the household size. OECD figures are based on survey data and for some countries breaks in the series prevent comparability over time. See OECD (2015) for more details.

[9] While mean income measured as GDP per capita or measured from survey means may significantly differ (see e.g. Milanovic 2002), under our assumption of lognormality our estimates of the tax rate are independent of the mean. Differences between both measurements of mean income would play out in our estimates for the (lump sum) government transfers, yet here these are only of secondary interest.

With gross income x lognormally distributed, $x \sim LN(\mu, \sigma^2)$, μ and σ can be estimated using G and mean per capita income $\bar{x}$. If the income distribution is lognormal, the Gini only depends on the standard deviation parameter σ, according to $G = 2\Phi(\sigma/\sqrt{2}) - 1$, where Φ represents the cumulative density function (CDF) of the standard normal distribution (see Aitchison and Brown 1957: 13 and Chotikapanich et al. 1997: 536). For an observed Gini G in a specific country and year:

$$\sigma = \sqrt{2}\Phi^{-1}((G+1)/2) \qquad (10)$$

Additionally, for GDP per capita equal to $\bar{x}$, the μ parameter of the country-specific lognormal gross income distribution is given by:

$$\mu = \ln \bar{x} - \sigma^2/2 \qquad (11)$$

In order to retrieve the distribution of disposable net income (y) on which net Gini (G_n) is based, we make a distinction between the (minimal) required tax rate t_g to finance public goods g and the tax rate $t - t_g$ required to finance the per capita lump sum income transfer c. One can think of t_g as the required tax rate in case $c = 0$. For the mean income earner, it must be the case that $t_g \bar{x} = $ g and $(t - t_g)\bar{x} = c$. So $\bar{y} = (1-t)\bar{x} + c = (1-t)\bar{x} + (t - t_g)\bar{x} = (1 - t_g)\bar{x}$. This basically amounts to tax revenues used to provide public goods driving a wedge between average gross and net income, while tax revenues used for redistribution, the disbursement of c, do not. For t_g we use country- and year-specific general government final consumption expenditure as a fraction of GDP, taken from the World Bank (2015).[10] Disposable net income is distributed according to $y \sim LN(\mu_n, \sigma_n^2)$, where by applying (10) and (11) and using G_n and $\bar{y}$ we can derive the parameters for σ_n and μ_n. The values of these parameters are of course determined by the real, but unobserved, tax-and-transfers system in a country in a particular year that shaped the net income distribution.[11] In the appendix, given μ and σ, we derive the parameters σ_n and μ_n as a function of the tax rates analytically. The

---

[10] This measure consists of 'general government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation' (World Bank 2015).

[11] For a non-linear tax schedule, Lubrano (2015: 23) remarks that it has been observed that in many countries the tax schedule can be approximated by $T(x) = x - ax^b$, so disposable income y can be expressed as $y = x - T(x) = ax^b$. A nice property of the lognormal distribution is that if $x \sim LN(\mu, \sigma^2)$, then $ax^b \sim LN(b\mu + \ln a, b^2\sigma^2)$, so disposable income is also lognormally distributed.

correlation of the corresponding simulated net Gini and the real observed net Gini from OECD (2015) is 0.993.

Under the assumption of a flat tax, lump sum transfer system, given the derived distributions of gross and net income, we can estimate $\hat{t}$ by making use of the properties of the lognormal distribution. In a distribution regression function:[12]

$$y_i = \underbrace{\frac{\text{Cov}[x,y]}{\text{Var}[x]}}_{1-\hat{t}} x_i + \underbrace{\bar{y} - \frac{\text{Cov}[x,y]}{\text{Var}[x]}\bar{x}}_{\hat{c}} \tag{12}$$

The predicted tax rate $\hat{t}$ is thus given by the following equation:

$$\hat{t} = \frac{\text{Var}[x] - \text{Cov}[x,y]}{\text{Var}[x]} \tag{13}$$

with

$$\text{Var}[x] = \left(e^{\sigma^2} - 1\right)e^{2\mu+\sigma^2} \tag{14}$$

and the covariance of two lognormally distributed variables:

$$\text{Cov}[x,y] = E(xy) - E(x)E(y) = e^{\mu+\mu_n+(\sigma^2+\sigma_n^2+2\rho\sigma\sigma_n)/2} - e^{\mu+\mu_n+(\sigma^2+\sigma_n^2)/2} \tag{15}$$

We choose to set $\rho = 1$, which amounts to the simplifying assumption that the tax-and-transfer system does not change the rank one has in the gross and net income distributions.[13] Given $\bar{y}, \bar{x}$ and $\hat{t}$, $\hat{c}$ follows from:

$$\hat{c} = \bar{y} - \frac{\text{Cov}[x,y]}{\text{Var}[x]}\bar{x} = e^{\mu_n+\sigma_n^2/2} - (1-\hat{t})e^{\mu+\sigma^2/2} = e^{\mu_n+\sigma_n^2/2}\left[1 - \frac{(e^{\sigma\sigma_n} - 1)}{(e^{\sigma^2} - 1)}\right] \tag{16}$$

Departing from the lognormal distribution of gross income, we can derive the distributions of wages, labor supply and the distribution of net income as a function of the tax rate. In order to retrieve the wage distribution, and in line with Roemer et al. (2003: 549), we first calibrate α so the labor supply L_m of the median earner is normalized to one, so $x_m = L_m w_m = w_m$. Using (2), this implies $\hat{\alpha} = (1-\hat{t})w_m = (1-\hat{t})e^{\mu}$.

We can now derive w_i by inverting gross income $x_i = w_i L_i^* = \left[\frac{1-\hat{t}}{\hat{\alpha}}\right]^{\eta} w_i^{1+\eta}$:

$$w_i = \left[\left(\frac{1-\hat{t}}{\hat{\alpha}}\right)^{-\eta} x_i\right]^{\frac{1}{1+\eta}} = \left[\left(\frac{1}{w_m}\right)^{-\eta} x_i\right]^{\frac{1}{1+\eta}} = [e^{\eta\mu} x_i]^{\frac{1}{1+\eta}} \tag{17}$$

---

[12] Alternatively, Roemer et al. (2003: 553) using micro survey data run a regression $y = a + bx$, where similarly the obtained regression coefficient b equals $1 - \hat{t}$ and coefficient a equals $\hat{c}$.

[13] This assumption is strong, as empirical work has shown in reality tax systems do re-rank households or individuals (see e.g. Jenkins 1988; Aronson et al. 1994).

In general, if $x \sim LN(\mu, \sigma^2)$, then $ax^b \sim LN(b\mu + \ln a, b^2\sigma^2)$, so the distribution of wages is also lognormal since the right hand side of (17) is of the form $w_i = ax_i^b$, with $a = e^{\eta\mu/(1+\eta)}$ and $b = 1/(1+\eta)$. The distribution of wages is then given by $w \sim LN(\mu, \sigma^2/(1+\eta)^2)$. Analogously, again using (2) and the parameters of the lognormal wage distribution, optimal labor supply[14] under $\hat{t}$ is lognormally distributed as $L^* \sim LN(0, [\eta\sigma/(1+\eta)]^2)$. Using the properties for the median and average of the lognormal distribution, Table 2-1 summarizes mean and median levels of gross income, wages and labor supply.

Table 2-1: The lognormal distribution of gross income (x), wages (w) and optimal labor supply (L^*) and expressions for median and mean values

$x \sim LN(\mu, \sigma^2)$	$w \sim LN(\mu, \sigma^2/(1+\eta)^2)$	$L^* \sim LN(0, [\eta\sigma/(1+\eta)]^2)$
$x_m = e^\mu$	$w_m = x_m = e^\mu$	$L^*_m = e^0 = 1$
$\bar{x} = e^{\mu+\sigma^2/2}$	$\bar{w} = e^{\mu+[\sigma/(1+\eta)]^2/2}$	$\bar{L}^* = e^{[\eta\sigma/(1+\eta)]^2/2}$

under $t = \hat{t}$, see Appendix 1 for distributions under alternative tax rates

One further simplification following from the lognormality assumption of gross and net income is that by rewriting (5) the preferred tax rate by the median earner becomes a function of the variance in gross income σ^2:

$$t_m = \frac{1 - e^{\sigma^2/2}}{1 - (1+\eta)e^{\sigma^2/2}} \qquad (18)$$

In general, the coordinates of points $F(x)$; $L(x)$ of the Lorenz curve generated by a lognormal distribution of $x \sim LN(\mu, \sigma^2)$ can be stated as $\Phi((\ln x - \mu)/\sigma)$; $\Phi((\ln x - \mu - \sigma^2)/\sigma)$. Using the parameters of the distribution of w, the percentile position in which the decisive gross (and net) wage earner $\hat{w}_D$ sits (denoted by P) is then given by its first coordinate:

$$P = \Phi\left(\frac{(1+\eta)(\ln \hat{w}_D - \mu)}{\sigma}\right) \qquad (19)$$

Our index of the median voter deviation (MVD) relates the percentile position P of the decisive voter $\hat{w}^D$ in the income distribution to that of the median earner w_m:

$$\text{MVD} = P - 0.5 \qquad (20)$$

Figure 2-2 depicts a Lorenz curve diagram, using the parameters of the USA in 2012. If the MVT were to hold, the decisive voter would be located in point M, with its abscissa equal to 50% (i.e., the median). We contrast it to our account of 'one dollar, one vote', in which income determines the voting outcome. Our operationalization of 'one dollar, one vote' differs from

---

[14] Since median labor supply under $\hat{t}$ is normalized to 1, if the tax rate is lowered, then median labor supply is higher than 1.

Karabarbounis (2011). In his account, since every dollar is a vote, an increase in the income of any group of voters relative to the mean tilts redistributive taxes closer to their preferred level. In our account, 'one dollar, one vote' entails that taxes are set at the level preferred by the individual located around a share of half of total income. Thus if 'one dollar, one vote' holds, then P would coincide with point P_x, with its ordinate equal to 50%, where half of total income is earned by those below this point. Point A denotes the location of the average earner, where the slope of the Lorenz curve is unity, so parallel to the line of equality. P_x is always located to the right of both M and A, M is always to the left of A and the decisive myopic voter P_y is always to the left of P_x, yet the location of M, A, P_y and P_x relative to our estimation of the location of the decisive voter P is an empirical question which we address below.

The solid line represents the gross distribution with $\mu = 10.34$, $\sigma = 0.97$ and $G = 0.51$; the dashed line represents the net distribution with $\mu_n = 10.37$, $\sigma_n = 0.72$ and $G_n = 0.39$.

Figure 2-2: Lorenz curves for the USA in 2012.

Table 2-2 gives the coordinates of these points M, A, P_x, P and P_y. The gross income level of the median earner is equal to e^μ. The income share s of all those earning up to the median income can be calculated using the formula for the incomplete first moment of the lognormal distribution:

$$\int_0^z xf(x)dx = e^{\mu+\sigma^2/2}\ \Phi\left(\frac{\ln z - \mu - \sigma^2}{\sigma}\right) \tag{21}$$

so the income share is:

$$s(x_m) = \frac{\int_0^{x_m} xf(x)dx}{\int_0^\infty xf(x)dx} = \frac{\int_0^{e^\mu} xf(x)dx}{\bar{x}} = \frac{e^{\mu+\sigma^2/2}\ \Phi\left(\frac{\ln e^\mu - \mu - \sigma^2}{\sigma}\right)}{e^{\mu+\sigma^2/2}} = \Phi(-\sigma) \tag{22}$$

The income share is equivalent to the ordinate of the Lorenz curve, that is, the percentile position on the vertical axis. The abscissa (p) of the median earner is by definition 0.5 or 50%. In a similar way, the income and population shares for the income earners A and P_x can be derived. For the coordinates of the decisive voter P, its gross income is $\hat{x}_D = \widehat{w}_D L^* = \widehat{w}_D^{1+\eta}\left(\frac{1-\hat{t}}{\hat{a}}\right)^\eta = \widehat{w}_D^{1+\eta}e^{-\eta\mu}$.[15] Since the lognormal distribution has the property that its corresponding Lorenz curve is symmetrical seen from the so-called 'alternative diagonal', the Lorenz asymmetry coefficient (Damgaard and Weiner 2000) defined as the sum of the Lorenz curve abscissa and ordinate at the mean earner (see the second row in Table 2-2) must be equal to 1.

To take stock, the assigned decisive voter according to the MVT is at the 50th percentile, according to the 'one dollar, one vote' it is P_x, based on the tax rate that aligns gross and net Ginis it is P and the net income maximizing voter predicts P_y. In the following section, we will investigate more into detail the positioning of the various decisive voters identified.

Table 2-2: Income levels and corresponding income and population shares of the median and average earner, the 'one dollar, one vote' earner and the decisive voter.

Variable	Level	Population share (p)	Income share (s)
x_m	e^μ	$\Phi(0) = 0.5$	$\Phi(-\sigma)$
$\bar{x}$	$e^{\mu+\sigma^2/2}$	$\Phi(\sigma/2)$	$\Phi(-\sigma/2)$
P_x	$e^{\mu+\sigma^2}$	$\Phi(\sigma)$	$\Phi(0) = 0.5$
P	$e^{-\eta\mu}\widehat{w}_D^{1+\eta}$	$\Phi[(1+\eta)(\ln \widehat{w}_D - \mu)/\sigma]$	$\Phi[(1+\eta)(\ln \widehat{w}_D - \mu - \sigma^2)/\sigma]$
P_y	$e^{-\eta\mu}\widehat{w}_D'^{1+\eta}$	$\Phi[(1+\eta)(\ln \widehat{w}_D' - \mu)/\sigma]$	$\Phi[(1+\eta)(\ln \widehat{w}_D' - \mu - \sigma^2)/\sigma]$

p is the (abscissa) percentile position of the Lorenz curve on the horizontal axis, s is the (ordinate) percentile position of the Lorenz curve on the vertical axis.

---

[15] Using $\overline{w^{1+\eta}} = x_m^\eta \bar{x}$, the gross income of the decisive voter as a function of the tax rate can be expressed as $\hat{x}_D = \frac{1-\hat{t}(1+\eta)}{1-\hat{t}}\bar{x}$.

4. Results

The position of the decisive voter in our method is of course dependent on the imposed wage elasticity of labor supply η, which determines the labor supply disincentives of higher taxation. In general, the higher the labor supply elasticity, the lower the tax revenues for a given tax rate. We assume the labor supply elasticity is constant across time and across countries. While this assumption is not unreasonable for men, where most studies find low η-values that do not largely differ between countries, findings for females exhibit higher values and more cross country variation. We take the weighted mean of 205 estimates of wage elasticity of labor supply for men and women in meta-regressions by Evers et al. (2008, see especially their Table 1 and 2 for the countries considered) based on studies of the uncompensated wage elasticity for a large number of OECD countries, leading us throughout the following analysis to present findings with η equal to 0.21. The online appendix elaborates on the findings for different values of η.

Table 2-3: Summary statistics for P, P_y and P_x

		Mean	SD	Min	Max	Obs
P_y	Overall	0.42	0.07	0.21	0.61	N=320
	- Between		0.07			n=33
	- Within		0.03			$\bar{T}$=10
P	Overall	0.50	0.07	0.28	0.68	N=320
	- Between		0.07			n=33
	- Within		0.03			$\bar{T}$=9.7
P_x	Overall	0.81	0.03	0.73	0.87	N=320
	- Between		0.03			n=33
	- Within		0.01			$\bar{T}$=9.7

SD: standard deviation, within and between refers to within and between countries.

Our method yields 320 country-year-specific values for P, P_x and P_y. For P, the two extremes are Finland (P=0.28 in 1994) and Chile (P=0.68 in 2006), with the average position of the decisive voter equal to 0.50 and an overall standard deviation of 0.07. As can be noted from Table 2-3, the between-country variance (0.07) is about twice as high as the within country variance (0.03). The largest within-country deviations occurred in Sweden, Finland and Ireland. According to Table 2-3 and illustrated in Figure 2-3, the position P_y of the 'myopic' decisive voter maximizing net income is lower than P. This follows from the comparison of (7) and (9), which shows the wage and income level of the myopic income-maximizing decisive voter $\hat{w}_D'(\hat{t})$ will always lie below $\hat{w}_D(\hat{t})$. The position of P_x, such that 50% of total gross income is below that point, has a range of only 14 percentile points. Due to lack of space to present results for all three percentile positions and since P sits nicely between P_y and P_x, in what follows we will concentrate on P.
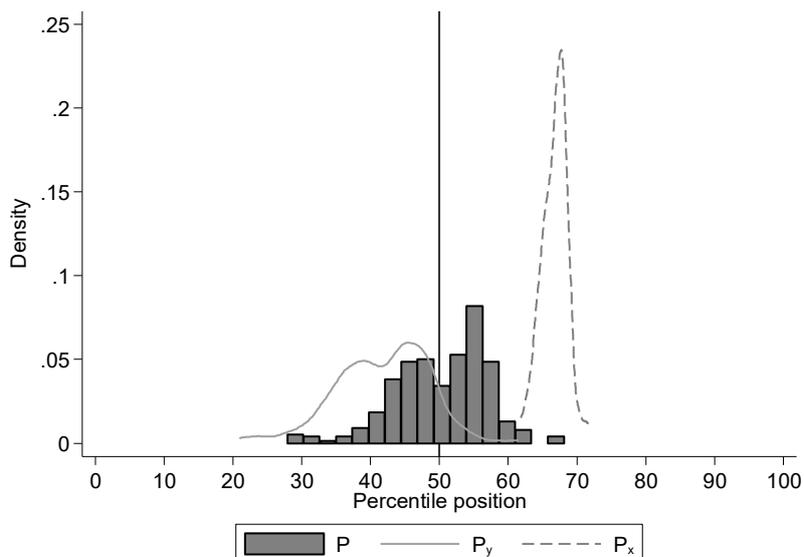
Figure 2-3: Distribution of P, P_y, and P_x

Table 2-4 provides the descriptive statistics for P for all OECD nations, showing the average decisive percentile $\bar{P}$ for each country, with its respective standard deviations, minimum and maximum and number of observations.

The MVT suggests that the median voter will be decisive in setting the tax rate. Table 2-4 however suggests that the MVT does not consistently apply across OECD countries. For instance, in Chile and the United States, the decisive voter is well above the median position, whereas in the Scandinavian countries it is well below the median. In a political system in which 'one dollar, one vote' would rule, higher market income inequalities would not be positively, but rather negatively associated with levels of taxation, implying higher inequalities lead to lower elected tax rates. In terms of the Lorenz curve diagram of Figure 2-2, increasing inequality corresponds to an outward shift of the Lorenz curve and a higher percentile position of P_x, hence a lower elected tax rate.

Table 2-4: Summary statistics for *P* by country

	Mean	SD	Min	Max	N
Australia	0.56	0.01	0.54	0.57	6
Austria*	0.47	0.01	0.46	0.49	9
Belgium*	0.44	0.02	0.41	0.47	9
Canada	0.54	0.02	0.50	0.56	36
Chile*	0.68	0.00	0.68	0.68	3
Czech Republic	0.45	0.01	0.44	0.47	11
Denmark	0.41	0.02	0.36	0.44	11
Estonia	0.55	0.02	0.52	0.57	9
Finland	0.39	0.05	0.28	0.46	27
France	0.48	0.01	0.46	0.49	7
Germany	0.48	0.01	0.45	0.49	9
Greece	0.54	0.02	0.51	0.57	8
Iceland	0.49	0.03	0.44	0.54	9
Ireland*	0.48	0.05	0.41	0.55	9
Israel	0.55	0.04	0.48	0.59	9
Italy	0.54	0.01	0.52	0.56	10
Japan	0.57	0.01	0.56	0.58	6
Korea	0.58	0.00	0.58	0.58	7
Luxembourg	0.50	0.01	0.48	0.51	9
Netherlands	0.49	0.02	0.46	0.53	12
New Zealand	0.56	0.02	0.51	0.57	8
Norway	0.46	0.02	0.45	0.49	8
Poland*	0.54	0.02	0.53	0.58	9
Portugal*	0.57	0.02	0.54	0.60	9
Russia	0.62	0.01	0.61	0.63	2
Slovakia	0.48	0.02	0.46	0.51	9
Slovenia	0.43	0.01	0.42	0.45	9
Spain*	0.56	0.01	0.55	0.57	9
Sweden	0.39	0.07	0.29	0.47	10
Switzerland*	0.57	0.00	0.57	0.57	2
Turkey	0.63	0.00	0.63	0.63	2
United Kingdom	0.55	0.02	0.51	0.58	16
United States	0.60	0.01	0.57	0.61	11

* Denotes a break in the series occurred (see OECD 2015)

Figure 2-4 allows us to study these associations, giving the relationship between the MVD, the elected tax rate $\hat{t}$ and gross income inequality measured by the Gini coefficient along four quadrants. The dashed lines depict the situation when MVT impeccably holds. The bottom left quadrant depicts the relationship between gross income inequality and the elected tax rate and the best fitting line. Chile is a notable outlier, combining high inequality with a low tax rate, while South Korea combines low inequality with a low tax rate. The RRMR model predicts the elected tax rate to move in the direction of the revenue-maximizing tax rate ($t^{\max}$) as gross income inequality is higher, i.e. the larger the difference between the median earner and mean earner, the more there is to gain for the median earner by voting for a higher tax rate. We find a positive relationship as expected, yet with a relatively low correlation ($\rho = 0.39$). While generally nations with higher gross income inequalities face higher tax rates, the low correlation implies that in some countries high income inequalities persist in the distribution of disposable

income, as they are not met with higher tax rates and transfers. The explanation for this weak association is to be found in the top left quadrant of Figure 2-4, which shows higher gross income inequalities are weakly associated with higher (and positive) median voter deviations ($\rho = 0.15$). As indicated in the figure, Sweden and Finland are notable outliers here.

Finally, in the top right quadrant of Figure 2-4 we find a strong negative association between the MVD and $\hat{t}$, which in itself is not surprising, as the MVD is a function of P (see (20)) and P in turn is determined by $\hat{t}$. In states where the MVD is lower, the tax rate is closer to the revenue-maximizing tax rate ($\rho = -0.78$). Within the class of countries marked by a positive MVD, the variance is higher, so some countries do implement sizeable tax-and-transfer programs, while others do not.
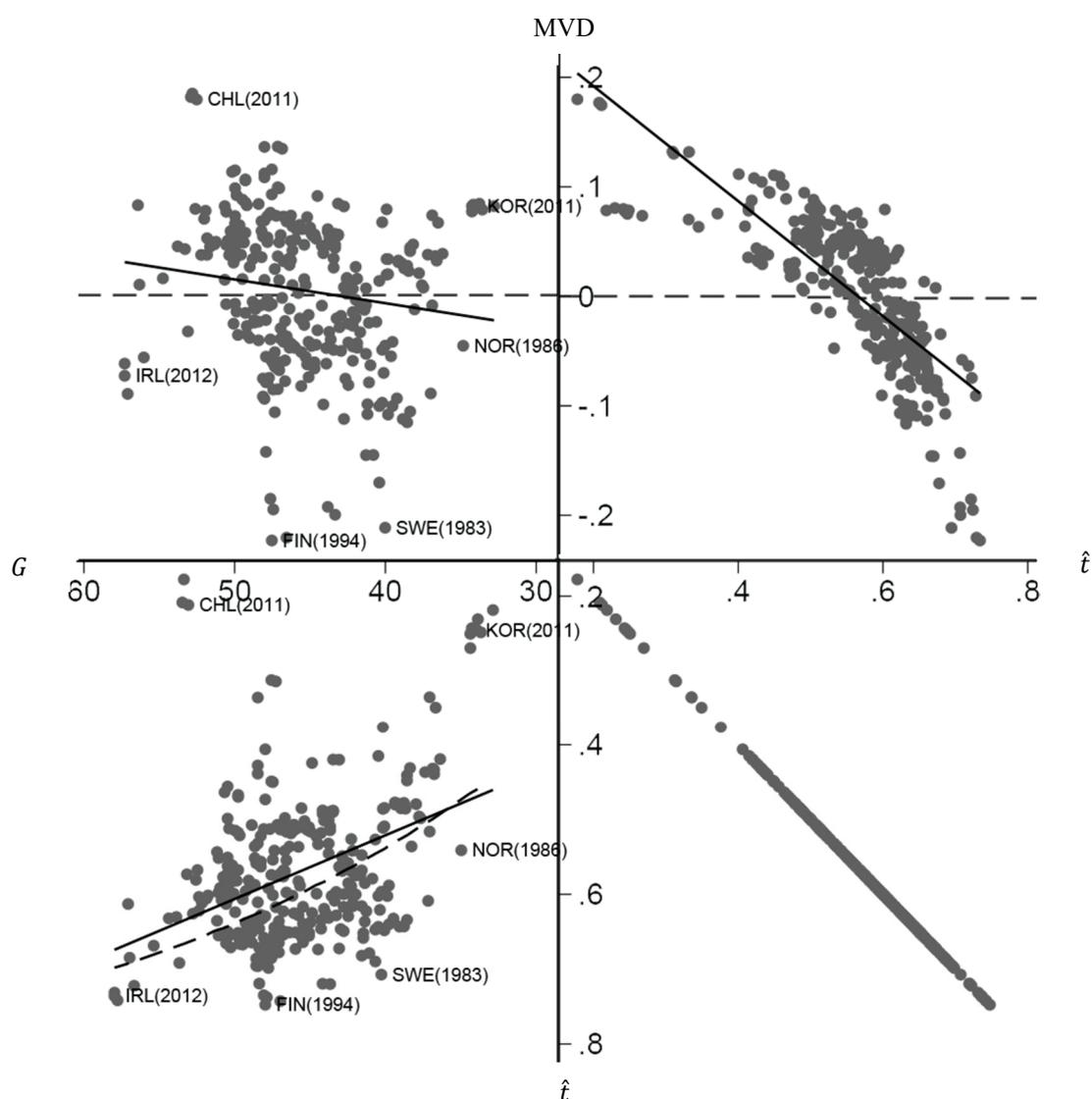
* Dashed lines indicate the relations under RRMR.
Figure 2-4: Quadrant graph with $\hat{t}$, median voter deviation (MVD) and market Gini G

In sum, if the MVT holds impeccably, then a much stronger positive relationship between market income inequality and the tax rate would be expected in the bottom left quadrant, with the MVD in the top quadrants always equal to zero, indicated by the dashed lines. The scatter plots in the upper quadrants illustrate that the MVD does not oscillate around zero, which suggests deviations from RRMR, that is large variations from the expected tax-and-transfer schemes. The RRMR framework thus seems unable to fully predict the cushioning effect of taxation and redistribution, especially for nations with relatively high market income inequality.

A second test of the RRMR model is provided by employing our model to simulate a world in which the RRMR hypothesis would perfectly hold. If throughout the OECD, the electoral systems did ensure political accountability towards the median voter, the decisive voter would coincide with the median earner at the 50th percentile in the income distribution, selecting tax rate t_m which maximizes her utility. For any t_m, we can simulate net income inequality (see Appendix) and find the relationship between simulated net income inequality under MVT and observed gross income inequality, both measured by Gini coefficients, as shown in Figure 2-5. In the same figure we superimpose the observed net Ginis, which thereby is indicative of the deviation of expected net income inequality under RRMR from observed net inequality. The largest of such deviations for our sample of countries by far are found in Chile (19 points on the Gini index), followed by Russia (10.5 points), Turkey (10 points), the United States (between 6.5 and 4 points) and Israel (4.5 points). The range of simulated net Ginis under MVT is quite narrow, whereas the range of observed net Ginis is much broader.
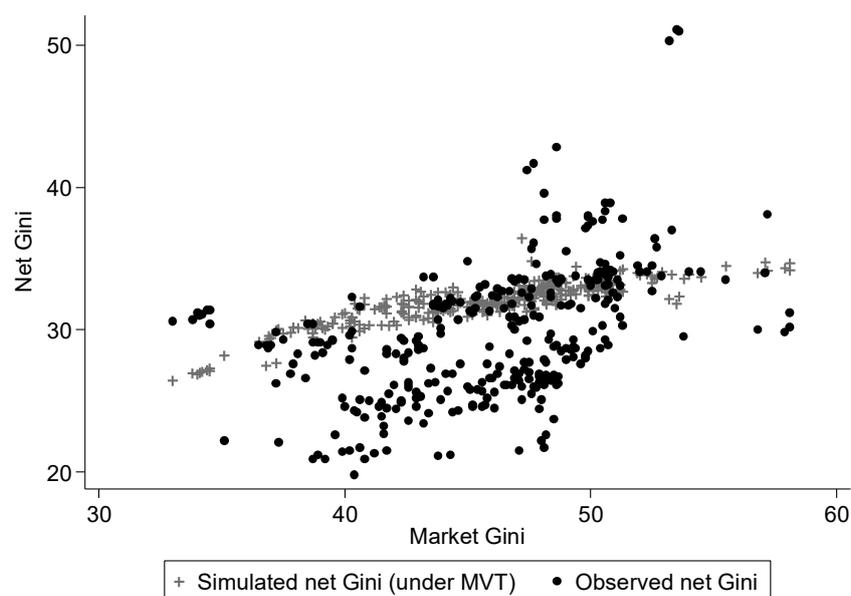
Figure 2-5: Association between net Gini (simulated and observed) and market Gini

This analysis makes clear three subsets of countries exist. A first subset is situated below the expected net Gini under the MVT, consisting of among others the Scandinavian countries, Slovenia, Czech Republic and Belgium. The second subset aligns with the expectation, including countries such as Australia and Canada on the one hand, and Estonia and Poland on the other. For the final subset of countries, net income inequality exceeds that expected under the RRMR framework, among others Turkey, Russia and the United States. Observed net inequality in the Netherlands (2012) and Germany (2011) is respectively only one and 0.3 Gini points lower compared to its predicted level. The opposite holds for the United Kingdom, where net income inequality is predicted to be 2.32 Gini points lower than that which is observed.

Potentially, there are numerous factors that might explain the variation in the position of the decisive voter relative to the median voter. We already noted that between countries this variation is twice as large as within countries over time (see Table 2-1), so it is natural to look for an explanation that focuses on differences between countries. Although it is beyond the scope of this study to do a full-fledged investigation of factors relevant for the positioning of the decisive voter, we choose to evoke the seminal work *The Three Worlds of Capitalism* by Esping-Andersen (1990) to see whether this well-documented taxonomy of welfare states is borne out in our estimates. Welfare state regimes each supplement the market economy with a legal framework extending social rights to citizens, but in different ways. The ideal typical liberal welfare state champions economic growth and efficiency, designing its social programs so as to avoid work disincentives and welfare dependency. The corporatist regime aims at social stability and social integration (taken as the opposite of social exclusion), with occupational social insurance as its predominant transfer program, focusing on the position of bread winners contingent on the occurrence of unemployment, disability and sickness. The social democratic regime, finally, gives priority to minimizing poverty, income inequality and unemployment, largely by means of tax-financed universal benefits and active labor market policies.

In Figure 2-6, we have pitched our measure of the MVD against the tax rate $\hat{t}$ for the final observed year to see if the type of welfare state matters. All liberal welfare states are indeed situated at the right corner, combining relatively low tax rates with percentile positions P of the decisive voter well above 50. All social democratic regimes are in the upper left corner, combining high tax rates with values for P below the median. Corporatist welfare states Germany, France and Austria are situated in between these liberal and social democratic clusters, flanked by Italy and Spain on the right and Belgium on the left. Regarding $\hat{t}$, this latter welfare state type resembles the social democratic type, yet on average at a MVD closer to zero. Differences between these two types, in other words, largely play out on the MVD axis.
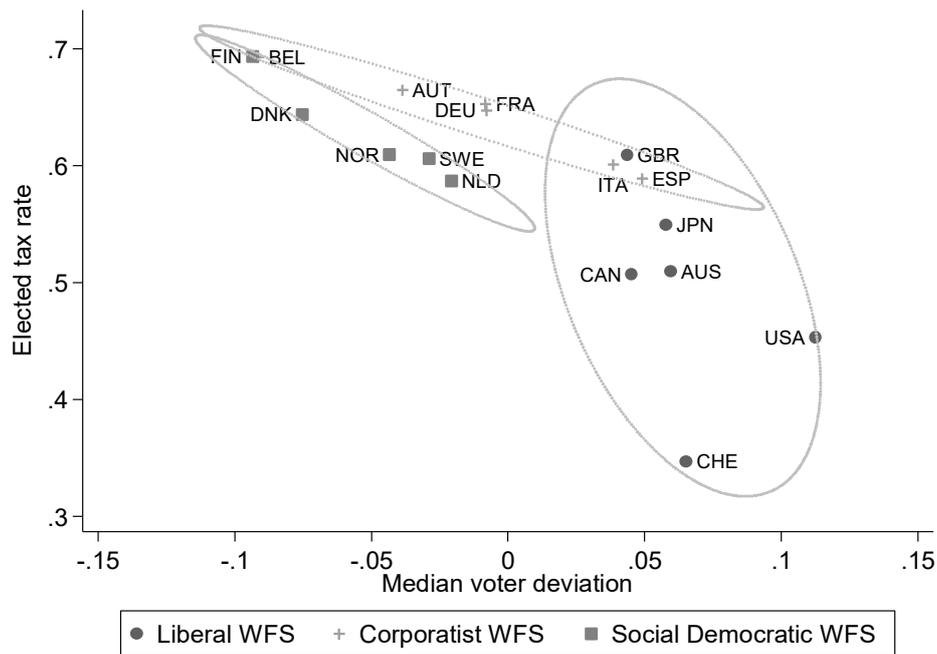
Figure 2-6: The tax rate and median voter deviation for the three welfare state (WFS) types

Besides the type of welfare state, another natural candidate to explain the variation in the position of the decisive voter is the phenomenon of skewed voter turnout, that is voter turnout tends to increase with income. Larcinese (2007) tries to improve the performance of the RRMR model by including voter turnout as an explanatory variable. Larcinese (2007) shows that to explain social expenditures as a percentage of GDP, voting turnout is positively significant whereas the ratio of median to mean income is insignificant. Kenworthy and Pontusson (2005: 459) also find that voter turnout is positively significant to explain redistribution, leading them to speculatively state 'the Meltzer-Richard model accurately identifies the distribution of market income and voter turnout as key variables in the politics of redistribution'. Looking at Table 2-4, if the hypothesis that skewed voter turnout shifts the effective median voter to the right in the income distribution holds, then we expect the higher our estimate of the position of the decisive voter, the more skewed voter turnout will be. For this analysis, ideally one requires voter turnout by income decile.

5. Conclusion

Recent rises in income and wealth inequality have led authors to question standing economic models predicting higher inequality will be met with increased redistribution. While most of these models evoke the MVT to ascertain the expected level of taxation, we set out to empirically retrieve the position of the decisive voter based on the observed gross and net Gini coefficients.

Combining data on gross and net income inequality and making a number of simplifying assumptions – in particular that gross income is lognormally distributed, that redistribution can be modelled as a flat tax-lump sum transfer, that voters choose their optimal tax rate and that the labor supply elasticity is constant across countries and time – allows us to estimate both the extent to which nations redistribute and the location of the decisive income earner. Using the information of the Gini coefficients for the gross and net income distribution, we find that on average the tax rate required to align the observed gross and net Gini coefficient is the tax rate that the median earner would prefer. This suggests that in the OECD, on average, the decisive voter is the median voter. Our method can be used to identify the decisive voter in non-OECD countries, as soon as reliable data becomes available for these countries. Although the MVT on average holds for the OECD, within this group of democratic and economically developed nations, diffuse patterns continue to persist. We show the taxonomy of welfare states into three types aligns with our findings. The decisive voter in the Netherlands (a social democratic welfare state) and Germany (a corporatist welfare state) is found to sit just below the median earner. In the United Kingdom (a liberal welfare state) however, the decisive voter is located far above the median earner.

Our method allows promising avenues for future efforts to study the relationship between political institutions and inequality, both between countries and within countries over time. We provide a framework in which better estimates of parameters, for example country- and time-specific elasticities of labor supply, or lifting some of our assumptions, e.g. allowing a non-linear tax-and-transfer scheme, can be included. Future work may also consider different distributions beyond the lognormal, testing the robustness of our estimates of the positions of the decisive voters to different distributional assumptions, such as the Weibull, Fisk or Gamma distributions.

Appendix

Derivation of the parameters for the lognormal distribution of net income under different tax rates

Gross income x is the product of one's wage rate and labor supply, given the tax rate $\hat{t}$ in place:

$$x = wL^* = \left[\frac{1-\hat{t}}{(1-\hat{t})w_m}\right]^{\eta} w^{1+\eta} \tag{1}$$

Median labor supply is normalized to one for the given tax rate $\hat{t}$. Wages are lognormally distributed according to $w \sim LN(\mu, \sigma^2/(1+\eta)^2)$ (see Table 2-1). We can calculate the distribution of gross wages under a different tax rate t', noting x then becomes a transformation of wages of the type $a \cdot w^b$, where $a = \left[\frac{1-t'}{(1-\hat{t})w_m}\right]^{\eta}$ and $b = 1 + \eta$. This gives the following distribution of x:

$$x \sim LN\left(\mu(1+\eta) + \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right)^{\eta}, \sigma^2\right) \tag{2}$$

If $t' = \hat{t}$, from (2) it then follows that $x \sim LN(\mu, \sigma^2)$. In order to find the distribution of net income y under t', we use the fact that the median net earner is the same individual as the median gross earner, giving $y_m = (1 - t')x_m + f - g$. This can subsequently be rewritten as

$$e^{\mu_n} = (1-t')e^{\mu(1+\eta)+\eta \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right)} + (t'-t_g)e^{\mu(1+\eta)+\eta \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right)+\sigma^2/2} \tag{3}$$

which, when solved for μ_n gives:

$$\mu_n = \mu(1+\eta) + \eta \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right) + \ln\left[(1-t') + (t'-t_g)e^{\sigma^2/2}\right] \tag{4}$$

In order to derive the variance parameter of the distribution of net income σ_n^2, we use the fact that $(1-t_g)\bar{x} = \bar{y}$, which can be written as:

$$(1-t_g)e^{\mu(1+\eta)+\eta \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right)+\sigma^2/2} = e^{\mu_n+\sigma_n^2/2} \tag{5}$$

Solving for σ_n^2 gives:

$$\sigma_n^2 = 2\left[\ln(1-t_g) + \mu(1+\eta) + \eta \ln\left(\frac{1-t'}{(1-\hat{t})w_m}\right) + \frac{\sigma^2}{2} - \mu_n\right] \tag{6}$$

Substitution of (4) into (6) gives the following expression of σ_n^2,

$$\sigma_n^2 = \sigma^2 - 2\left[\ln\left[(1-t') + (t'-t_g)e^{\sigma^2/2}\right] - \ln(1-t_g)\right] \tag{7}$$

We can simulate a net Gini for any given level of t' using the square root of (7):

$$G_n = 2\Phi\left(\frac{\sigma_n}{\sqrt{2}}\right) - 1 \tag{8}$$

'Man tends to act by either overestimation or neglect' (Mandelbrot 1997)

Chapter 3: **More than Meets the Eye? Redistributive Preferences under Incomplete Information**[16]

Abstract: Economic theory on the relationship between inequality and redistribution generally departs from a voter equipped with full information. Informational imperfections have however been found to be manifold. Beliefs concerning the role of government, the distribution of income, and one's position in it are shown to theoretically drive preferences away from standard analytical results. Using survey data, an empirical method is presented to disentangle in what ways beliefs about one's location in the income distribution and distribution of income itself affect demand for redistribution. The empirical outcomes show Dutch voters systematically overestimate both the dispersion and their location within the distribution of household income. Cross-national findings indicate such biases are not unique to the Netherlands. One's actual income position however is shown to be a better predictor of redistributive preferences compared to one's perceived income position, and given one's actual income position, neither over- nor underestimation are found to significantly affect preferences regarding the distribution of income.

1. Introduction

Any understanding of redistributive politics in democracies requires an understanding of the formation of such redistributive preferences. The canonical models in economics explaining redistributive preferences depart from fully informed voters, yet information imperfections have been found to be manifold. This chapter sets out to broaden this understanding by introducing two informational imperfections facing voters: those regarding the role of government and those regarding the shape of the income distribution and one's position in it.

Redistributive preferences are argued not to be formed in a vacuum, but rather to be a function of the type of policies in place. While very visible welfare state programs can garner and maintain high levels of support, more obfuscated redistributive programs may lack or even undermine support. Secondly, information about the income distribution is generally incomplete, as individuals sample the actual income distribution from their immediate social surrounding and have a tendency to overestimate their position. Letting go of this assumption of full information, both processes may steer individuals away from voting in their direct pocket book interests.

This chapter offers three contributions to the literature. It firstly demonstrates the theoretical equivalence between incomplete information regarding the role of government and incomplete information regarding one's place in the income distribution with respect to voting outcomes. Secondly, it presents a novel method to indirectly distill one's perceived location

---

within a perceived income distribution from survey data. Thirdly, it is the first contribution known to the literature assessing whether one's actual or one's perceived income position is more important in determining one's redistributive preferences. This question is important, as while the findings of this chapter make clear one's actual income position is rarely known to respondents, to date nearly all studies make use of actual income. Our findings however show it is one's actual, rather than one's perceived income position that best predicts one's redistributive preferences.

Section 2 lays out the theoretical framework, and illustrates the mechanism through which incomplete information may alter preferences. The equivalence between underestimating (overestimating) the redistributive role of government and overestimating (underestimating) one's position in the income distribution is demonstrated. Section 3 describes the data and method used to test expectations regarding preferences for redistribution, the result of which are given in section 4. The final part of this section offers some additional longitudinal and cross-national evidence. The conclusions discuss the findings and offer directions for future work disentangling the manner in which redistributive preferences are formed by one's income position, both actual and perceived.

2. Theoretical framework

The canonical Meltzer and Richard (1981) model (henceforth MR) sheds light on the question how democratic nations deal with differences in income or wealth. It models the outcome of an election in which citizens vote on a proportional tax rate, the revenues of which are redistributed in equal lump sum shares to all citizens. Under such a simplified fiscal system and a number of assumptions[17], the median voter is decisive, and his preferred tax rate is elected. MR find redistribution to be a function of the relative distance between the median voter and mean income earner, constrained by the disincentive effects of income taxation. Growing inequality increases this distance between the median voter and the mean earner, suggesting higher market income inequalities translate into higher preferred tax rates by the median voter. This process can partly offset increases in market income inequality.

Implying some degree of 'self-correction' of inequality in democracies, the model is however subject to much scrutiny, both regarding its empirical success and its assumptions. Why hasn't democracy slowed rising inequality?, ask Bonica et al. (2013), referring to the American growth in inequality over the last two generations. Their answer is that MR among

---

[17] Including single-peaked preferences, see Persson and Tabellini (2002: 120).

other things fail to incorporate the effects of lobbying, political polarization, policy gridlock and non-turnout in elections. Others specifically criticize underlying assumptions of the model—a model based both solely on self-interest and on voters equipped with incredibly strong cognitive capacities. In order to get at the predicted outcomes voters must show up and must be both able to correctly specify the income distribution and their position in it and to fully grasp the disincentive effects of taxation. Information thus lies at the heart of the model, yet in reality informational imperfections are ubiquitous.

Endogenizing politics

Among these informational imperfections are those regarding the role of government. While a large body of literature has explored the way in which the salience of tax rates affects public expenditures, suggesting tax payers face a 'fiscal illusion' by which they do not fully perceive the tax bill (Buchanan 1967), only more recently studies have focused on possible information imperfections on the output side of government activities. Why would citizens only be imperfectly informed on the cost side of public production, and not the supply side? Anecdotal evidence by Mettler (2011) illustrates information here may also be missing, reporting on a town hall meeting in which a congressman is told to keep his "government hands" off the (public) Medicare program. The prevailing idea that Medicare is not a government program may not be so strange after all, Mettler (2011) suggests, as one in four beneficiaries receive their benefits issued through private insurance companies, and appear to be engaged in a market transaction.

The MR model does not pick up such misperceptions, as it simplifies transfer programs to one lump sum transfer (i.e. a basic income) funded by a proportional tax rate on income. While such an affine fiscal system reasonably approximates that of many nations (Roemer et al. 2003; Groot and Van der Linde 2016), in reality redistribution of income is the result of numerous social programs, some more and some less visible, and of varying tax rates and laws. Social programs extend from unemployment and old-age insurance to such policies offering child, housing or health care benefits. Tax rates vary in progressivity, while numerous tax deductions are in place. Finally, and importantly, a large share of redistribution is in-kind, resulting from for instance the public funding of education or health care.

Theoretically, one can then construct infinite ways to reach the same net effect, using different combinations of taxes and transfers. In certain cases, however, differently designed programs producing identical outcomes can arouse different sentiments across the population. A recent proposal for health care reform in the Netherlands is an illustration of this, where the

introduction of an income-dependent system of health care insurance premiums would not severely affect real spending on health care, but replace a complicated system of uniform basic insurance premiums coupled with income-dependent government transfers. What would however radically change was the face of spending: The costs of health care, currently obfuscated by the tax system, would be replaced by very visible, individualized health care premiums. Unexpected heavy protests led the coalition to retract the policy, leaving the formateur to wonder whether 'solidarity is stronger when it is not visible to the eye, rather than when it is out in the open' (Bos 2013).

Does the visibility of policies in general affect their support? Alesina et al. (2000) argue disguised redistributive policies can be used to circumvent opposition to explicit tax-transfer schemes. Mettler (2011b) shows it are specific types of government policies—especially those mediated through the tax code, or following from subsidies to and provision through private companies—that obscure the role of government, negatively affecting the perception of government compared to more salient policies. As policies and their impact become more visible, Mettler and Koch (2012) show for the United States the likelihood citizens view government as beneficial grows.

Inequality and position within the income distribution

Just as the visibility of policies may influence citizens' information about the role of government, and hence influence their preferences for redistributive government programs, so may information regarding the income distribution. Two distinct biases can affect one's perception: Individuals may firstly over- or underestimate the degree of inequality (i.e. misperceive the distribution), while secondly, they may over- or underestimate their position within this distribution (i.e. misperceive their location).

While MR assume full information on both location and distribution, there is reason to believe structural biases plague the assessment of both distribution and location, resting on priors established in behavioral theory. Tverksy and Kahneman (1973) demonstrate the existence of a so-called 'availability heuristic' which guides individuals' judgements of frequencies.[18] As individuals cannot possibly construct all instances upon which to base their assessment of a frequency, they attempt to construct some instances known, or 'available' to them, judging the overall frequency from this knowledge. This causes classes whose instances are more readily recalled to be judged more numerous than similarly sized classes for which less instances are available.

---

[18] Kahneman (2011) later refers to this as the 'what you see is all there is' (WYSIATI) fallacy.

If individuals sample the overall income distribution using their own social surroundings, the availability heuristic implies one's reference groups is endogenous to one's position. As the population generally is clustered spatially and/or by social circle (Dawtry et al. 2015; Cruces et al. 2013), this heuristic explains biased beliefs about the income distribution, unrepresentative of the actual distribution. A second bias operating within this perceived distribution is caused by a self-enhancing or self-depreciative process (Galesic et al. 2012), whereby a 'desire to blend in' (Gimpelson and Treisman 2015) may lead people to perceive their location in the income distribution different from reality, upwardly in case of a self-enhancing process or downwardly in case of a self-depreciating process.

Several studies have assessed beliefs about the distribution of income or wealth. Norton and Ariely (2011) find Americans underestimate wealth inequality in the United States, while Chambers et al. (2014) in turn find Americans on average overestimate wage inequalities. Dawtry et al. (2015) and Galesic et al. (2012) find evidence for social sampling for the United States, New Zealand and the Netherlands, respectively. Cruces et al. (2013) provide evidence of biases in distributional perceptions using Argentinian survey data. Niehues (2014) shows Germans perceive a majority of citizens to belong to the class of low-income individuals, whereas in reality the largest population share sits around the middle income classes.

Likewise, a number of studies focuses on perceptions of location, yet have reached findings likely to be country-specific. Karadja et al. (2014) find Swedish individuals on average underestimate the level of their personal income (relative to administrative income data) as well as the position they hold within the distribution of personal income. Gimpelson and Treisman (2014: 17) however conclude only the rich tend to underestimate their income position, while the poor tend to overestimate their position, leading them to conclude both 'believe they are closer to the national median than is, in fact, the case'. Galesic et al. (2012) finally finds evidence of self-enhancing evaluations of one's household income position for the Netherlands.

Two studies have theoretically modeled the effects of relaxing these assumptions within the MR framework. Bredemeier (2014) introduces imperfect information about the distribution of productivity, while Hansen (2005) introduces uncertainty regarding government revenues. Both authors however model these different effects similarly, implying the two different effects are likely to produce similar outcomes. The following section demonstrates such equivalence.

The MR Model: Voting under perfect information

In order to model the effects of imperfect information regarding government's role and the income distribution, the MR model is presented as a baseline in the specification of Roemer, et

al. (2003). Utility is linear in disposable income (y) and decreasing in labor supply (L). The tax-and-transfer scheme is assumed to be based on a proportional tax with tax rate t with transfers f, which are distributed lump sum. Heterogeneity in income is achieved by allowing individuals' wage rate (w)—and thus productivity to differ. Linearity in y simplifies the analysis and implies the income effect is fully absorbed through increases in consumption.

$$U(y, L) = y - \alpha L^{1+1/\eta} \quad \text{s.t. } y = (1 - t)wL + f \tag{1}$$

Individuals select their optimal labor supply L^* by weighing the increase in net income from working one additional hour to the utility cost of sacrificing one more hour of leisure. This gives the optimal labor supply L^* for a given tax rate and productivity level:

$$L_i^* = \left[\frac{(1-t)w_i}{\hat{\alpha}} \right]^{\eta} \tag{2}$$

with $\hat{\alpha} = \alpha(1 + 1/\eta)$. Separability of the utility function entails labor supply decisions are not affected by the extent of the transfer f, i.e. $\partial x/\partial L^* = \partial y/\partial L^*$. The wage elasticity of labor supply can be shown to be captured by η which determines the deadweight loss of taxation[19]. Using that $\bar{y} = \bar{x}$,[20] the balanced government budget constraint, where $\bar{x}(t)$ refers to mean gross income, itself endogenously determined by t, is given by:

$$f = t\bar{x}(t) = t \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \int w^{1+\eta} dF = t \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \overline{w^{1+\eta}} \tag{3}$$

with F representing the CDF of wages. Tax increases have two effects on the level of the transfer, as made clear by (4): they (a) increase transfers by more heavily taxing the tax base, while they (b) affect average income by way of the disincentive effect, and thus lower the size of the tax base, decreasing transfers. The first effect dominates the latter until the maximum of this function is reached (as $f_{tt} < 0$, $f(t)$ is a strictly concave Laffer-type function). As can be seen from (4), the maximum is given by the (Rawlsian) tax rate $t = 1/(1 + \eta)$.

$$\frac{\partial f}{\partial t} = \underbrace{\left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \overline{w^{1+\eta}}}_{\bar{x}(t)} - t \underbrace{\frac{\eta}{\hat{\alpha}} \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta-1} \overline{w^{1+\eta}}}_{\frac{\partial \bar{x}(t)}{\partial t}} = \left[\frac{1-t}{\hat{\alpha}} \right]^{\eta} \overline{w^{1+\eta}} \left\{ 1 - \frac{t\eta}{1-t} \right\} \tag{4}$$

---

[19] $\frac{\partial L^*}{\partial w} \cdot \frac{w}{L^*} = \left[\eta \left[\frac{(1-t)w}{\hat{\alpha}} \right]^{\eta-1} \cdot \frac{1-t}{\hat{\alpha}} \right] \frac{w}{\left[\frac{(1-t)w}{\hat{\alpha}} \right]^{\eta}} = \eta$

[20] Implying all redistribution operates through (t, f), hence no redistribution is in-kind.

Substituting (2) and (3) into (1) yields the indirect utility function V, which differentiated with respect to t gives the preferred tax rate t_i of an individual. Maximizing indirect utility with respect to t in effect means balancing the benefits of tax increases (which increase f at a decreasing rate, as explained above) to the decrease in disposable income from labor that follows from higher taxation. This crucial tradeoff changes upon the introduction of imperfect information of voters below.

$$V(y, t, L^*) = \left[\frac{1-t}{\hat{\alpha}}\right]^{\eta} \left\{ w^{1+\eta}\left(\frac{1-t}{1+\eta}\right) + t\overline{w^{1+\eta}} \right\} \tag{5}$$

For notational simplicity, $w_i^{1+\eta}$ is defined as A, and its mean $\overline{w^{1+\eta}}$ as B. t_i can be shown to be a function of the distance between both A and B, given the disincentive effect of taxation determined by η, with support $t_i \in \left[0, \frac{1}{1+\eta}\right]$.

$$t_i = \frac{w^{1+\eta} - \overline{w^{1+\eta}}}{w^{1+\eta} - (1+\eta)\overline{w^{1+\eta}}} = \frac{A - B}{A - (1+\eta)B} \tag{6}$$

In words, given the assumption of an affine and linear redistribution scheme, voters for whom A is sufficiently below-average prefer positive tax rates, with tax rates further rising with decreases in A.[21] Holding constant A, the effect is similar for increases in B, e.g. when high income shares increase. The general result of MR type models follows from the fact that the median voter A_m is below B in a society with a skewed income distribution, such that higher market income inequalities increase the demand for redistribution, which then cushion the effects of market income inequality in the distribution of disposable income.

A useful assumption is that of a lognormal distribution of w, implying $w^{1+\eta} \sim LN(\mu, \sigma)$ is also lognormally distributed. The percentile positions of A and B, $F(A)$ and $F(B)$ can then be given by:

$$F(A) = \Phi\left[\frac{\ln A - \mu}{\sigma}\right] \quad \text{and} \quad F(B) = \Phi\left[\frac{\ln B - \mu}{\sigma}\right] = \Phi\left[\frac{\ln e^{\mu+\sigma^2/2} - \mu}{\sigma}\right] = \Phi\left[\frac{\sigma}{2}\right] \tag{7}$$

which then gives levels A and B as a function of their relative position in the distribution of $w^{1+\eta}$.

---

[21] This effect $\partial t_i/\partial A$ is equal to the effect of closing in one mean income $\frac{\partial t_i}{\partial(A-B)} = -\frac{B\eta}{(A-(1+\eta)B)^2}$. The effect is negative, implying that the closer A grows to B, the lower the preferred tax rate.

$$A = e^{\Phi^{-1}[F(A)]\sigma+\mu} \quad \text{and} \quad B = e^{\Phi^{-1}[F(B)]\sigma+\mu} = e^{\mu+\sigma^2/2} \tag{8}$$

Using the above equations and the assumption of lognormality, the baseline t_i can be rewritten as a function of one's position $F(A)$ given the dispersion of wages (σ) in (8). Figure 3-1 gives this baseline relationship between t_i and $F(A)$ for a given σ.

$$t_i = \frac{e^{\Phi^{-1}[F(A)]\sigma} - e^{\sigma^2/2}}{e^{\Phi^{-1}[F(A)]\sigma} - (1+\eta)e^{\sigma^2/2}} \tag{9}$$
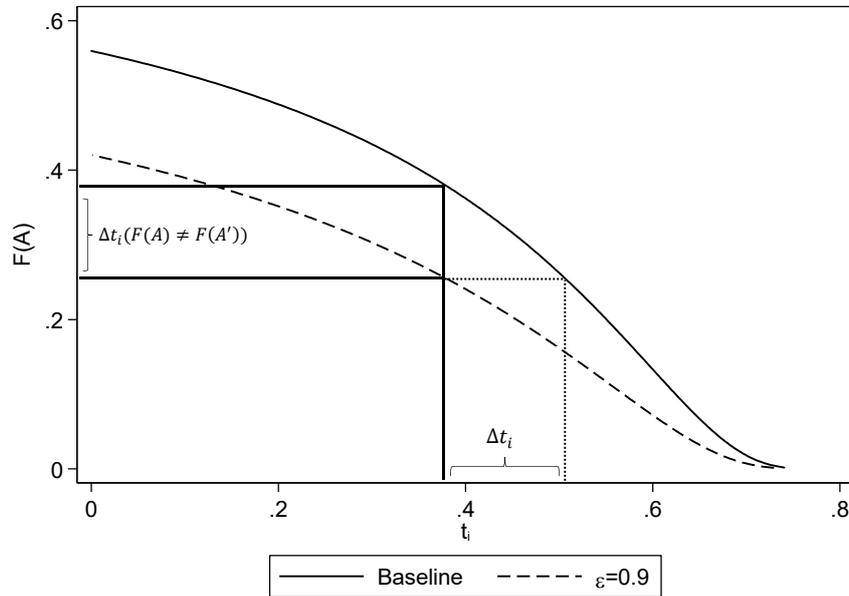
Figure 3-1: Equivalence between overestimating income position and underestimating the role of government

Deviating from MR: Introducing imperfect information about government

The crucial tradeoff in MR demonstrated above is balancing the benefits of tax increases on the transfer amount to the decreases in disposable labor income that follow from such higher taxation. If however policies become less visible, and thereby the perceived benefits of taxation decrease, this tradeoff alters. Such perceptions about the role of government are included following Hansen (2005), where informational imperfections regarding f are captured in the above model by way of the variable ε_i. Hansen (2005) demonstrates the equilibrium effects of ε, showing under median voter rule, higher uncertainty about f is expected to decrease tax rates, in effect implying high income voters are better off under such uncertainty. The main interest here lies in the individual's response to imperfect information about ε, especially in the case where $\varepsilon_i < 1$. Individuals may however similarly overestimate the generosity of government to

redirect resources, with $\varepsilon_i > 1$. The government budget constraint, (3), is rewritten to a perceived constraint (10), where transfers are now perceived to be of level f'

$$f' = \varepsilon_i(t\bar{x}) = \varepsilon_i t \left[\frac{1-t}{\hat{\alpha}}\right]^\eta B \tag{10}$$

Indirect utility in (11) now includes the distortionary term ε_i, as does the preferred tax rate t_i' in (12). It can be demonstrated that lower visibility of policies lowers the effective support for redistribution, as t_i' is lower than t_i.[22] This is also clear from Figure 3-1, showing the preferred tax rate under $\varepsilon = 0.9$. Furthermore, this effect can be shown to grow with income. While at the lower end of the income scale informational imperfections have little effect, around the median position far larger swings in predicted support for redistribution become visible. The reasoning is the following: Having little to no income, the tradeoff between higher taxes which may increase transfer income yet decrease disposable income from labor is not much affected by latter effect, and the preferred tax rate will remain high irrespective of perceptions of government. At higher levels of income, this tradeoff becomes more pronounced, and noticing the effects taxation has on one's own disposable income from labor, underestimation of the government's uses of this tax money reduces general support for redistribution.

$$V' = \left[\frac{(1-t)}{\hat{\alpha}}\right]^\eta \left\{ A\left(\frac{1-t}{1+\eta}\right) + Bt\varepsilon_i \right\} \tag{11}$$

$$t_i' = \frac{A - \varepsilon_i B}{A - (1+\eta)\varepsilon_i B} \tag{12}$$

While ideally one would establish an empirical measure of ε_i to test its effects on t_i (the effect in fn. 22), both reverse causality (where redistributive preferences may in turn also determine one's political information, e.g. through cognitive dissonance) and difficulties in finding a good measure are likely to arise. Only experimental studies with randomized information treatments (both in the laboratory and through survey experiments) thus far have been able to yield insights into the effects of ε_i (see e.g. Jacobsen et al. 2014; Faricy and Ellis 2014)

The empirical strategy used below is different, and guided by finding a change which would produce an effect equivalent to the effect of ε_i, while holding constant variables which capture parts of ε, such as political interest and knowledge. The predicted effects, if any, then

---

[22] The effect can be demonstrated by $\frac{\partial t_i'}{\partial \varepsilon} = \frac{\eta AB}{(A-\varepsilon(1+\eta)B)^2}$, which is always positive, showing that more visible redistribution by the state would lead to a higher preferred tax rate, holding income constant.

be assumed to work similarly for ε_i. The difference between the baseline model and the effect of ε is given by Δt_i in (13). Under the assumption of lognormality, it can be written as (14).

$$\Delta t_i = \frac{A - B}{A - (1+\eta)B} - \frac{A - \varepsilon_i B}{A - (1+\eta)\varepsilon_i B} \tag{13}$$

$$\Delta t_i = \frac{e^{\Phi^{-1}[F(A)]\sigma+\mu} - e^{\mu+\sigma^2/2}}{e^{\Phi^{-1}[F(A)]\sigma+\mu} - (1+\eta)e^{\mu+\sigma^2/2}} - \frac{e^{\Phi^{-1}[F(A)]\sigma+\mu} - \varepsilon_i e^{\mu+\sigma^2/2}}{e^{\Phi^{-1}[F(A)]\sigma+\mu} - (1+\eta)\varepsilon_i e^{\mu+\sigma^2/2}} \tag{14}$$

Two channels produce effects equivalent to Δt_i and are explored here. They include faulty beliefs regarding one's location $F(A')$, and faulty beliefs regarding the dispersion of income σ'. Finally, these both effects may operate jointly.

The effect of under- or overestimating one's location $F(A')$ relative to one's actual location $F(A)$ is equivalent to Δt_i if it is able to annul the effect of Δt_i. This effect of over- or underestimating one's position in the distribution $\Delta t_i(F(A) \neq F(A'))$ is given in (15).

$$\Delta t_i(F(A) \neq F(A')) = \frac{e^{\Phi^{-1}[F(A)]\sigma+\mu} - e^{\mu+\sigma^2/2}}{e^{\Phi^{-1}[F(A)]\sigma+\mu} - (1+\eta)e^{\mu+\sigma^2/2}} - \frac{e^{\Phi^{-1}[F(A')]\sigma+\mu} - e^{\mu+\sigma^2/2}}{e^{\Phi^{-1}[F(A')]\sigma+\mu} - (1+\eta)e^{\mu+\sigma^2/2}} \tag{15}$$

Equating Δt_i and $\Delta t_i(F(A) \neq F(A'))$ and solving shows the effect of ε_i is equivalent to erring in the assessment of ones' position by (16). In words: underestimating the redistributive capacity of government under full information about one's location in the distribution of wages produces an effect equivalent to overestimating one's location within this distribution under full information about the redistributive capacity of government.

$$\varepsilon_i = e^{\Phi^{-1}[F(A)]\sigma - \Phi^{-1}[F(A')]\sigma} \tag{16}$$

This equivalence is graphically demonstrated in Figure 3-1. It can also be numerically illustrated: Suppose $w^{1+\eta} \sim LN(3, 0.3)$ and $\eta=0.21$, then $B = e^{3+0.3^2/2} \approx 21$. An individual i at $F(A) = 0.29$ has a corresponding level of $A = e^{\Phi^{-1}[0.29]0.3+3} \approx 17$. Under full information ($\varepsilon = 1$), the preferred tax rate t_i equals 0.48. Now imagine this same individual underestimating the redistributive capacity of government, by say $\varepsilon_i = 0.9$. The preferred tax rate t_i' decreases to 0.32, so $\Delta t_i = 0.16$. If on the other hand this same voter had full information about government transfers (i.e. $\varepsilon_i = 1$), $\Delta t_i = 0.16$ corresponds to an overestimation of $F(A)$ by a factor $\varepsilon_i = e^{\Phi^{-1}[F(A)]\sigma - \Phi^{-1}[F(A')]\sigma} = e^{\Phi^{-1}[0.29]0.3 - \Phi^{-1}[F(A')]0.3}$, which gives a perceived income position $F(A')$ of $\Phi\left[\frac{\Phi^{-1}[0.29]\cdot 0.3 - \ln \varepsilon_i}{\sigma}\right] = 0.42$. This translates into a perceived income level of $A' = e^{\Phi^{-1}[0.42]0.3+3} \approx 18.9$, which again gives t_i of 0.32, as found above. The effects

of underestimating the redistributive capacity of government by $\varepsilon = 0.9$ for this voter thus are the same as overestimating one's income position by 13 percentile points.

Similarly, faulty beliefs regarding the distribution of $w^{1+\eta}$ itself, by way of σ' can be introduced. The effect of over- or underestimating the dispersion in the distribution of $w^{1+\eta}$, $\Delta t_i(\sigma \neq \sigma')$ is given in (17).

$$\Delta t_i(\sigma \neq \sigma') = \frac{e^{\Phi^{-1}[F(A)]\sigma+\mu} - e^{\mu+\sigma^2/2}}{e^{\Phi^{-1}[F(A)]\sigma+\mu} - (1+\eta)e^{\mu+\sigma^2/2}} - \frac{e^{\Phi^{-1}[F(A)]\sigma'+\mu} - e^{\mu+\sigma'^2/2}}{e^{\Phi^{-1}[F(A)]\sigma'+\mu} - (1+\eta)e^{\mu+\sigma'^2/2}} \qquad (17)$$

Equating Δt_i and $\Delta t_i(\sigma \neq \sigma')$, shows the effect of ε_i is equivalent to erring in the assessment the dispersion, given by equation (18). In words: underestimating the redistributive capacity of government under full information regarding the dispersion of wages produces an effect equivalent to underestimating the dispersion of wages under full information about the redistributive capacity of government. This is illustrated in Figure 3-2 for the median voter $(F(A) = 0.5)$.

$$\varepsilon_i = e^{\Phi^{-1}[F(A)](\sigma-\sigma')+0.5(\sigma'^2-\sigma^2)} \qquad (18)$$

As a numeric illustration, now again suppose as above $w^{1+\eta} \sim LN(3, 0.3)$ and η=0.21, $B \approx 21$. An individual i at $F(A) = 0.29$ under full information ($\varepsilon = 1$), will prefer $t_i = 0.48$ and under incomplete information ($\varepsilon_i = 0.9$) will prefer $t'_i = 0.32$, so $\Delta t_i = 0.16$. If on the other hand this same voter had full information about government transfers (i.e. $\varepsilon_i = 1$), $\Delta t_i = 0.16$ corresponds to an underestimation of σ by a factor $\varepsilon_i = e^{\Phi^{-1}[F(A)](\sigma-\sigma')+0.5(\sigma'^2-\sigma^2)} = e^{\Phi^{-1}[0.29](0.3-\sigma')+0.5(\sigma'^2-0.3^2)}$, which gives a perceived dispersion $\sigma' = 0.166$, under which by (9) t_i again gives 0.32, as found above. The effects of underestimating the redistributive capacity of government by $\varepsilon = 0.9$ for this voter thus are the same as underestimation the dispersion of wages by 0.134.
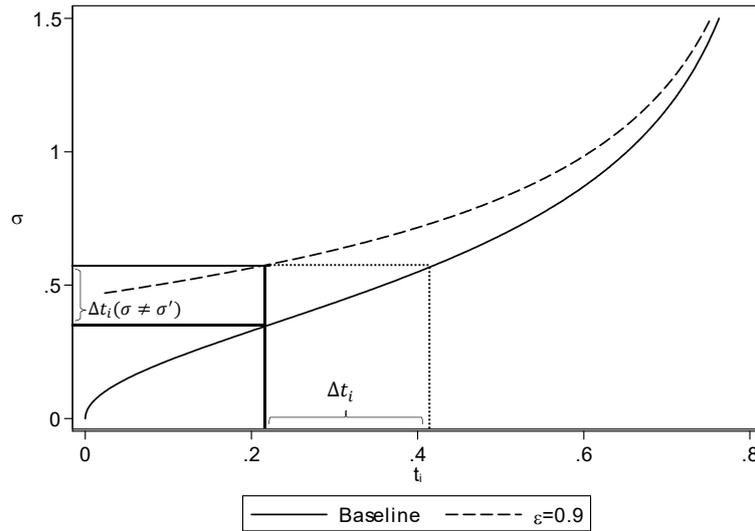
Figure 3-2: Equivalence between underestimating the dispersion of income and underestimating the role of government

Finally, as both processes in (16) and (18) may either counteract or operate jointly, their joint effect can be given by (19).

$$\varepsilon_i = e^{\Phi^{-1}[F(A)]\sigma - \Phi^{-1}[F(A')]\sigma' + 0.5(\sigma'^2 - \sigma^2)} \tag{19}$$

3. Data and method

As argued above, misperceptions about the governments' capacity to redistribute, about one's location in the wage distribution, or about the dispersion of wages can lead to a deviation in the preferred tax rate by the decisive voter. To assess the relevance of these misperceptions we need information about the beliefs of voters. Two surveys from the Dutch LISS (2016) Panel can be used for this purpose. The survey *Effect of perceived social distributions on subjective well-being* from July 2008 was collected among 2,500 respondents, and is used to construct the perceived distribution and locations of respondents. It is matched to a survey containing respondents' background characteristics in July 2008 and wave 1 of the *Politics and Values* survey collected in December 2007 (and March 2008 for non-respondents), measuring redistributive preferences. Only household heads and their partners are considered. Data pertains to the distribution of net household income y, rather than wages w as used above. Percentile locations of respondents are used, giving $F(y)$ for one's location in the actual distribution of net income, and $F(y')$ for one's location in the perceived distribution. Under the assumptions made above, including that of an affine tax and transfer system, $F(y) = F(A)$ for every individual. B is proxied using $F(\bar{y})$ and $F(\bar{y}')$, which however gives downwardly biased measures of B, as following taxes and transfers the variance of y is lower than that of $w^{1+\eta}$.

Similarly, σ in the model pertains to the dispersion of wages, while below the dispersion of net income σ_y is used, likely to be lower given the impact of taxes and transfers.

$F(y)$, $F(\bar{y})$ and σ_y are derived by fitting a lognormal distribution to observed net household income derived from respondents' background characteristics of July 2008 ($N = 4{,}535$)[23]. I drop 20 extreme outliers for whom monthly net household income is over €15,000, suspected to have reported either yearly figures or missing decimals (LISS 2008). Furthermore, 43 respondents have a net household income of zero, and cannot be used in the calculations (but are located at $F(y) = 0$). The lognormal fit is highly significant, and distributed according to $\mu_y = 7.79$ and $\sigma_y = 0.522$. Figure 3-3 gives the distributional diagnostic probability plot for the Lognormal fit, showing the lognormal distribution adequately captures the empirical distribution. Mean income is given by $\bar{y} = e^{\mu_y + \sigma_y^2/2} = €2{,}770$ per month[24]. The percentile position corresponding to mean net income $F(\bar{y})$ is given by $\Phi(\sigma_y/2) = 0.603$, Φ being the CDF of the standard normal distribution. The lognormal distribution quite accurately captures the actual distribution, as the predicted Gini coefficient under the assumption of lognormality is given by $G = 2\Phi(\sigma_y/\sqrt{2}) - 1 = 0.288$, and closely resembles estimates of the same coefficient found by Caminada et al. (2014) to be 0.28.
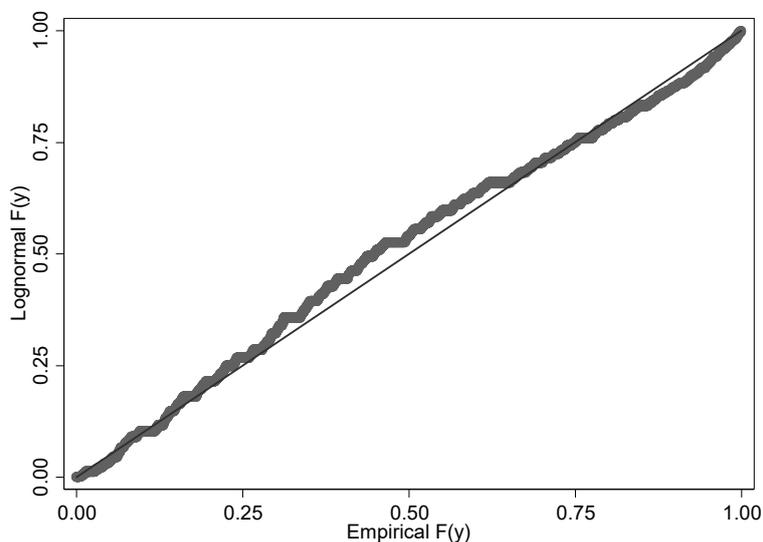
Figure 3-3: Distributional diagnostic probability plot for the Lognormal fit

---

[23] In many cases the LISS panel interviews multiple members within a single household. In this case I use only one respondent per household to estimate the distribution of household income, later imputing these values for all household members.

[24] CBS (2016) figures find the average disposable yearly income of households in 2008 to be €33,100, which monthly would give €2758.

In order to find respondents' perceived location $F(y')$, the following question is used:

> *"The next question is about total net household income of adults in the Netherlands within the last month. Total income includes incomes from payments, pensions, rents, dividends, etc. of all members of the household added up to each other. By 'net' we mean income left after taxation. What percentages of adults living in the Netherlands fall into the following categories"*

for which respondents estimate the percentage of people n_b that fall into the following bins b: up to €1000, €1,001 – €1,500, €1,501 – €2,000, €2,001 – €2,500, €2,501 – €3,000, €3,001 – €5,000, and €5,001 or more. Aided by bars, responses must add up to 100% in order to continue. Individuals allocating the income distribution among less than four of these bins are dropped ($N=75$), as statistics become unreliable. In order to reduce this binned perceived income distribution to a distribution for which summary statistics can be derived, the *Robust Pareto Midpoint Estimator* (RPME) is used (Von Hippel et al. 2014), which makes two simplifying assumptions about the perceived distributions. It firstly assumes a uniform distribution within each bin, giving the midpoint $m_b = \mu_b = (l_b + u_b)/2$, with l_b and u_b the respective lower and upper boundaries in bin b. As for the top bin B, u_B is lacking, the RPME module assumes the top bin to follow a Pareto distribution with shape parameter α. From this follows a mean of the top bin μ_B:

$$\mu_B = \begin{cases} l_B \left[\dfrac{\alpha}{\alpha - 1} \right] & \text{if } \alpha > 1 \\ \infty & \text{if } \alpha \leq 1 \end{cases} \tag{20}$$

The shape parameter is estimated for each individual i by the following equation:

$$\hat{\alpha}_i = \frac{\ln(n_{B-1} + n_B/n_B)}{\ln(l_B/l_{B-1})} = \frac{\ln(n_{B-1} + n_B) - \ln(n_B)}{\ln(l_B) - \ln(l_{B-1})} \tag{21}$$

As Von Hippel et al. (2014) show, the μ_B-statistic may get very large as $\hat{\alpha}$ gets small. The lower the α, the fatter the upper end tail in the perceived income distribution. Two corrections are suggested for robustness. Firstly, a minimum value $\alpha_{\min}$ of 1 is set for $\hat{\alpha}$. Secondly, instead of using the mean μ_B for m_B, which becomes arbitrarily large as α is closer to one, the authors propose using the harmonic mean h_B which is less sensitive to α.[25]

    Knowing the respondents' actual household income, combined with the assumption of a uniform distribution within bins, the percentile position corresponding to this income within an individuals' perceived distribution $F(y')$ can be found, as can perceived mean income $\bar{y}'$ and its corresponding perceived percentile position $F(\bar{y}')$. If located in the upper tail, the CDF

---

[25] Under the Pareto distribution, the harmonic mean $h_B = l_B(1 + 1/\alpha)$. See Von Hippel et al. (2014), figure 1.

of the Pareto distribution is used for the last bin, given by $1 - \left(1/y_i\right)^{\hat{\alpha}_i}$. Figure 3-4 illustrates this perceived distribution for a single respondent, superimposing the empirical distribution of net household income by a Kernel density function. This respondent sits well below both perceived and actual mean income, while perceived mean income is only slightly left of actual mean income. The corresponding $\hat{\alpha}_i$ parameter equals 1.32.
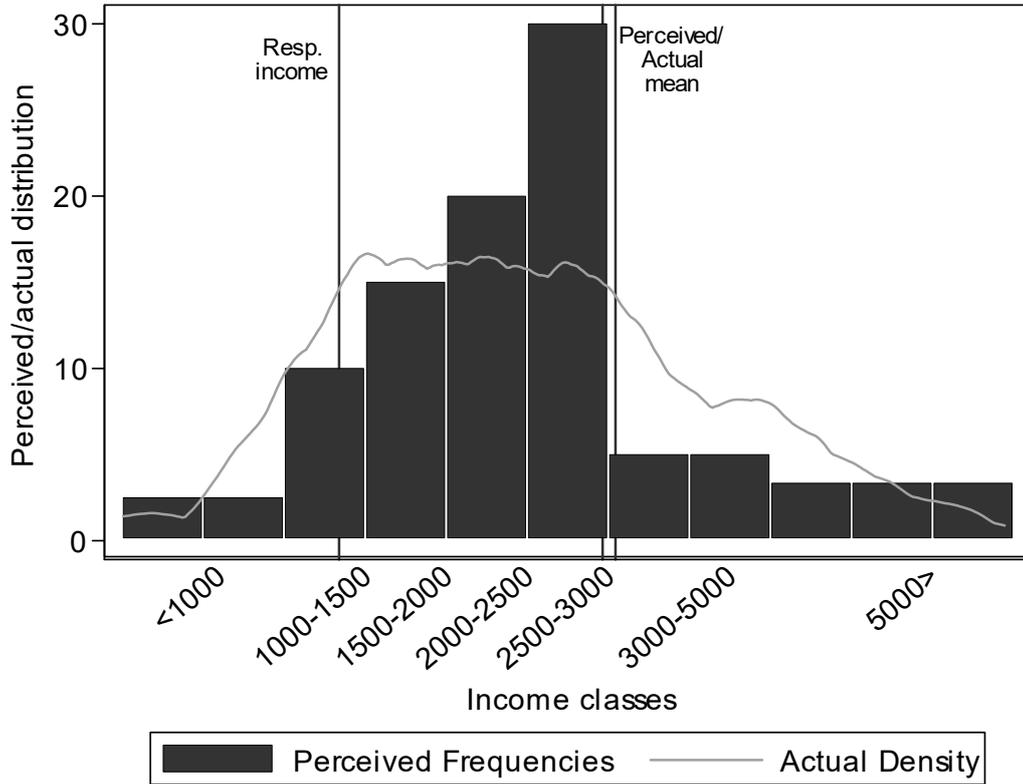
Figure 3-4: Perceived and actual distribution of net household income

The perceived distribution gives an individualized estimate of the perceived dispersion of income σ_y', measured as the standard deviation of the logs (SDL), using midpoints m_b weighed by n_b.

$$\sigma_y' = \sqrt{\sum_{b=1}^{B} \frac{n_b}{100}\left(\ln m_b - \sum_{b=1}^{B} \frac{n_b}{100}\left[\ln m_b\right]\right)^2} \tag{22}$$

4. Results

While the perceived distributions, as the one in Figure 3-4, do not necessarily follow the lognormal distribution, the three formulations of the equivalent ε_i given above in equations (16), (18) and (19) are useful to understand the occurrence and magnitude of average misperceptions among respondents. In its first formulation, (16) is applied with the empirically

derived $\sigma_y = 0.522$. The mean value of ε is 0.79 (SD: 0.23), implying on average citizens largely overestimate their position in the net household income distribution. Figure 3-5 makes this clear, giving the relationship between $F(y)$ and $F(y')$. Only around 12% of respondents underestimates their net household income position (given by observations above the 45º line), while the other 88% overestimate their position (below the 45º line). The quadratic fit makes clear overestimation is most prevalent among the middle income group, whereas both low and high incomes generally place themselves better in the income distribution. For these income groups this is rather tautological, as at a certain point either under- or overestimation is no longer is possible. This also partly explains the high correlation of $\rho = 0.87$ between $F(y)$ and $F(y')$.
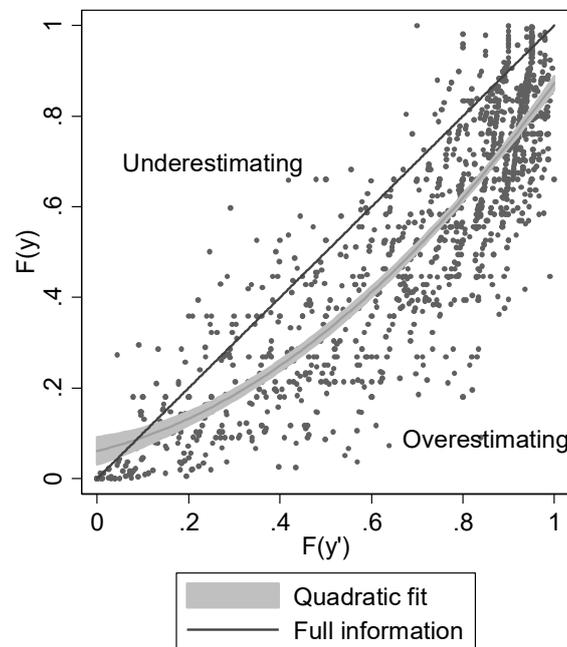
Figure 3-5: Respondents' estimation of income position

Biases in perceptions of σ_y above were shown also able to shift preferences, as shown in the second formulation of ε_i from (18). Again using $\sigma_y = 0.522$, the mean value of ε using (18) is 1.13 (SD: 0.33), implying on average individuals tend to overestimate the dispersion of income. This tendency to overestimate the dispersion is shown in Figure 3-6, where the vertical line indicates the actual dispersion of income.
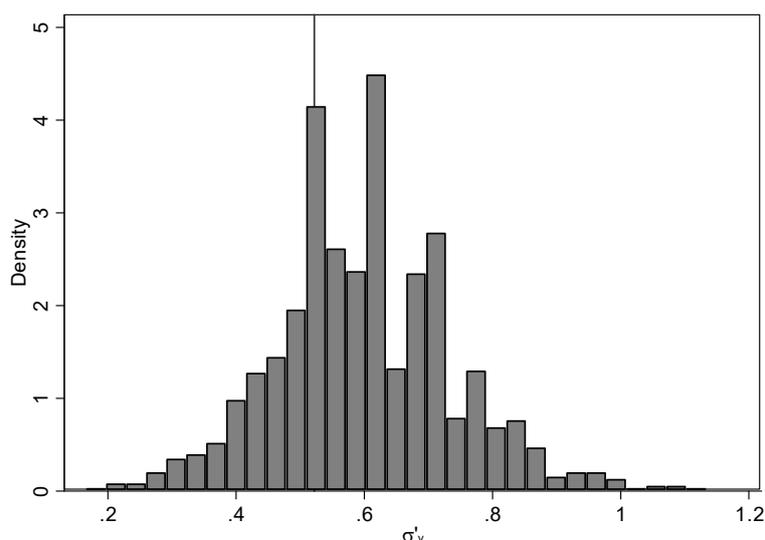
Figure 3-6: The distribution of the perceived dispersion of income σ'_y

In its final formulation of ε_i from above, both effects are included jointly. Using the equation (19), a mean value of 0.82 (SD: 0.29) is found, implying the effect of overestimation overall works stronger than beliefs about dispersion may counteract. Both effects hence jointly still could shift individuals' preferences away from those expected under full information.

In order to test whether and how these perceptions affect preferences, respondents' Redistributive Preferences (henceforth RP) are predicted using their answer to the question:

> *Where would you place yourself on a scale from 1 to 5, where 1 means that differences in income should increase and 5 means that these should decrease?*

Answers to this Likert item are predicted using an ordered logit regression, fitting a proportional odds model. The probability of a given observation belonging to any of the c number of categories (in this case five) are tabulated, where $j = 1$ gives the minimum value, and so on, and is given by:

$$p_{ij} = \Pr(\mathrm{RP}_i = j) = \Pr\left(c_{j-1} < x_i\beta + u < c_j\right) = \frac{1}{1 - \exp\left(-c_j + x_i\beta\right)} - \frac{1}{1 - \exp\left(-c_{j-1} + x_i\beta\right)}$$

With $c_0 = -\infty$ and $c_j = +\infty$ and an error term u. Individuals that respond 'I don't know' are dropped, resulting in 1,094 overlapping observations from both surveys. The histograms in Figure 3-7 give the distribution of RP by actual income quartiles. While overall only a small fraction of respondents prefers differences in income to increase, compared to those that are either neutral (35%) or weakly or strongly prefer differences in income to decrease (55%), strong differences exist between the income quartiles. Members of the lowest quartile are far

more likely to prefer a reduction in income differences (5) compared to the highest, which is most likely to be neutral regarding the statement (3).
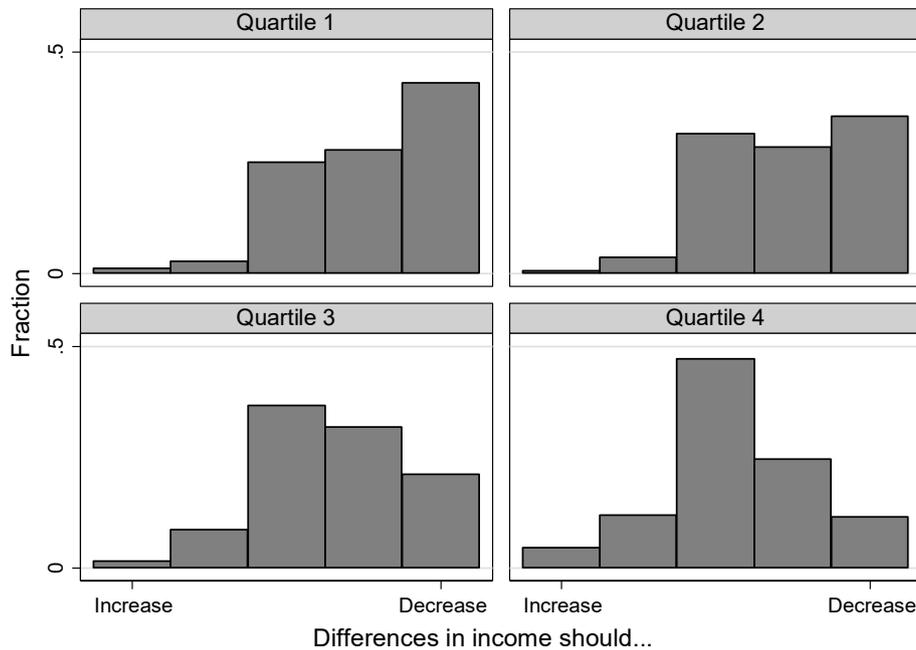
Figure 3-7: Redistributive preferences by income quartile

The crucial question in the following analysis is which is a better predictor of redistributive preferences: $F(y)$ or $F(y')$. In this section, alternatively the predictive power of perceived and actual income position is assessed, as well as its joint significance, shining a light on which of the two variables can better predict one's preferences.

Firstly, a Meltzer Richard-type model is run as baseline, in which redistributive preferences are predicted by $F(y)$, implicitly controlling for the dispersion of income σ_y and the position of the mean income earner $F(\bar{y})$, which are assumed to be known constants (Specification 1). Specification (2) lets go of this latter assumption, and introduces misperceptions about the distribution and the position of the mean earner by way of including σ_y' and $F(\bar{y}')$ as predictor variables. In specification (3), $F(y')$ is used, rather than $F(y)$.

Throughout all these regression, educational level dummies are included[26], furthermore correcting for gender, age, age^2, the urban character of one's place of residence, the number of household members (including children), and a possible tendency for social desirable answering given the dependent variable, using the Marlowe-Crowne Social Desirability Scale (MC-SDS) (Crowne and Marlowe 1960). Controls furthermore seek to capture misperceptions

---

[26] Results for education not displayed for brevity. Occupational dummies were also added, but amount to a loss of 100 observations with no discernable effect on other coefficients, and are thus omitted.

about government ε_i best as possible, including response dummy variables of political interest (POLINT), satisfaction with government (GOVSAT) and membership of a political party (POLMEM) and yes or no answers to the questions '*I have a clear picture of the most important political issues in our country*' (POLISS) and '*Politics sometimes seems so complicated that people like me can hardly understand what is going on*' (POLCOM).

A large body of research has shown social preferences may be mediated by social heterogeneity (see e.g. Lind 2007; Austen-Smith and Wallerstein 2006), such as ethnic diversity, arguing for greater solidarity among a social group that one identifies with (one's 'in-group'). In order to correct for this possible confounder, dummy response items (ranging from fully disagree to fully agree) are included with the question '*There are too many people of foreign origin or descent in the Netherlands*' (FOREIGN). Beliefs about work are held constant by inclusion of dummy response variables ranging from full agreement to full disagreement with the statement '*Work should always come first, even if it means having less leisure time*' (WORK). Finally, satisfaction with current household income is controlled for by the inclusion of a variable capturing the level of household net income the respondent would be satisfied with (measured by five bins). Standard errors are clustered by household, as in certain cases multiple household members respond to the survey. In order to answer the question whether one's actual or perceived position is a better predictor of redistributive preferences, the Akaike Information Criterion (AIC) is compared across the specifications, where lower values imply higher predictive power.

Table 3-1: Ordered Logistic Regression estimates of redistributive preferences

	(1)	(2)	(3)	(4)	(5)	(FD1)	(FD2)
$F(y)$	0.097***	0.098***		0.055***	0.104***	0.252**	0.101**
	(0.033)	(0.033)		(0.031)	(0.036)	(0.136)	(0.096)
$F(y')$			0.261***	1.900			
			(0.074)	(0.922)			
$F(y') - F(y)$					0.642		
					(0.485)		
σ_y'		2.393*	2.120	2.566*	2.566*		
		(1.183)	(1.049)	(1.286)	(1.286)		
$F(\bar{y}')$		1.262	0.942	1.440	1.440		
		(1.031)	(0.772)	(1.177)	(1.177)		
MC-SDS	1.087***	1.082***	1.087***	1.077**	1.077**		
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)		
Female	1.412***	1.388**	1.296**	1.427***	1.427***		
	(0.181)	(0.177)	(0.165)	(0.185)	(0.185)		
Age	1.083**	1.081**	1.073**	1.079**	1.079**		
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)		
Age^2	0.999*	0.999	1.000	1.000	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
WORK *(RC: fully disagree)*							
Disagree	0.556***	0.564***	0.544***	0.569***	0.569***	0.929	0.924
	(0.102)	(0.104)	(0.100)	(0.104)	(0.104)	(0.077)	(0.077)
Neither agree nor disagree	0.463***	0.468***	0.462***	0.473***	0.473***	0.895	0.883
	(0.098)	(0.099)	(0.098)	(0.100)	(0.100)	(0.086)	(0.086)
Agree	0.358***	0.362***	0.367***	0.360***	0.360***	0.821*	0.821*
	(0.094)	(0.095)	(0.097)	(0.095)	(0.095)	(0.096)	(0.097)
Fully agree	0.382**	0.379**	0.339**	0.389**	0.389**	0.803	0.816
	(0.178)	(0.175)	(0.156)	(0.181)	(0.181)	(0.197)	(0.203)
FOREIGN *(RC: Fully agree)*							
Fully disagree	4.199***	4.278***	4.150***	4.257***	4.199***	1.177	1.150
	(1.477)	(1.500)	(1.481)	(1.494)	(1.477)	(0.229)	(0.224)
Disagree	1.908**	1.907**	1.707**	1.954***	1.908**	1.169	1.176
	(0.482)	(0.481)	(0.432)	(0.492)	(0.482)	(0.160)	(0.161)
Neither agree nor disagree	0.918	0.942	0.910	0.945	0.918	1.135	1.139
	(0.198)	(0.203)	(0.200)	(0.204)	(0.198)	(0.139)	(0.140)
Agree	0.908	0.906	0.861	0.912	0.908	0.977	0.979
	(0.205)	(0.205)	(0.198)	(0.206)	(0.205)	(0.101)	(0.102)
POLCOM	0.677***	0.688***	0.665***	0.694***	0.677***	0.901*	0.903*
	(0.090)	(0.092)	(0.088)	(0.093)	(0.090)	(0.052)	(0.052)
POLISS	0.888	0.883	0.863	0.887	0.887	0.970	0.961

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(0.123)	(0.122)	(0.117)	(0.123)	(0.123)	(0.055)	(0.055)
GOVSAT *(RC: Neither Satisfied Nor Dissatisfied)*							
Very Dissatisfied	2.436**	2.413**	2.648**	2.359**	2.359**	1.352**	1.365**
	(0.898)	(0.892)	(1.005)	(0.871)	(0.871)	(0.180)	(0.184)
Dissatisfied	1.053	1.045	1.091	1.035	1.035	0.947	0.946
	(0.139)	(0.138)	(0.141)	(0.137)	(0.137)	(0.057)	(0.058)
Satisfied	0.956	0.947	0.951	0.953	0.953	0.915	0.917
	(0.177)	(0.177)	(0.179)	(0.178)	(0.178)	(0.061)	(0.062)
Very Satisfied	1.124	1.011	0.992	1.077	1.077	1.711	1.561
	(0.995)	(0.869)	(0.833)	(0.915)	(0.915)	(0.642)	(0.577)
POLMEM	0.733	0.742	0.781	0.732	0.732	0.828	0.842
	(0.177)	(0.178)	(0.183)	(0.177)	(0.177)	(0.230)	(0.242)
POLINT *(RC: Very interested)*							
Fairly Interested	0.838	0.842	0.834	0.839	0.839	1.023	1.022
	(0.167)	(0.168)	(0.171)	(0.166)	(0.166)	(0.095)	(0.097)
Not Interested	1.235	1.250	1.258	1.237	1.237	1.062	1.058
	(0.331)	(0.336)	(0.340)	(0.331)	(0.331)	(0.142)	(0.143)
Degree of urbanization *(RC: Extremely urban)*							
Very urban	0.787	0.787	0.796	0.772	0.772	1.471	2.040
	(0.181)	(0.183)	(0.187)	(0.181)	(0.181)	(1.744)	(2.630)
Moderately urban	0.909	0.909	0.868	0.901	0.901	0.978	0.966
	(0.219)	(0.221)	(0.212)	(0.219)	(0.219)	(0.813)	(0.826)
Slightly urban	0.878	0.882	0.918	0.866	0.866	0.302	0.251
	(0.217)	(0.219)	(0.229)	(0.216)	(0.216)	(0.382)	(0.338)
Not urban	1.154	1.150	1.174	1.140	1.140	0.170**	0.182**
	(0.290)	(0.291)	(0.296)	(0.289)	(0.289)	(0.128)	(0.144)
Satisfying level of household income *(RC: Up to €1,500)*							
€1,501 - €2,000	0.920	0.919	0.969	0.902	0.902		
	(0.239)	(0.237)	(0.244)	(0.234)	(0.234)		
€2,001 – 2,500	1.165	1.211	1.140	1.181	1.181		
	(0.273)	(0.284)	(0.264)	(0.279)	(0.279)		
€2,501 - €3,000	1.470	1.516*	1.187	1.513*	1.513*		
	(0.366)	(0.377)	(0.287)	(0.378)	(0.378)		
€3,001 or more	0.960	0.980	0.648*	1.001	1.001		
	(0.254)	(0.258)	(0.159)	(0.265)	(0.265)		
Number of household members	1.072	1.077	1.037	1.075	1.075	0.847	0.994
	(0.060)	(0.061)	(0.058)	(0.061)	(0.061)	(0.194)	(0.239)
Rental or cost free dwelling *(RC#: self-owned dwelling)*	1.190	1.176	1.330*	1.185	1.185	1.931*	1.730
	(0.198)	(0.196)	(0.219)	(0.198)	(0.198)	(0.681)	(0.604)

Educational dummies   Included in all specifications

χ^2	254.1***	255.9***	237.4***	255.0***	255.0***	164.3***	105.8***
Pseudo-R^2	0.097	0.098	0.089	0.099	0.099	0.005	0.005
N	1094	1094	1094	1094	1094	4025	3945
AIC	2728.75	2729.01	2757.31	2729.08	2729.08	9896.61	9809.33
BIC	2933.7	2943.9	2972.2	2949.0	2949.0	9959.5	10041.7
Wald tests							
Age	22.54***	21.09***	16.20***	21.31***	21.31***		
Marginal effect of age	0.03***	0.026***	0.022***	0.027***	0.027***		
WORK	19.01***	18.52***	18.70***	18.47***	18.47***	2.97	2.89
FOREIGN	38.20***	37.85***	34.90***	38.44***	38.44***	4.27	4.34
GOVSAT	6.19	6.10	7.10	5.77	5.77	10.89**	10.39**
POLINT	5.09*	5.18*	5.80*	5.03*	5.03*	0.21	0.18
Satisfying level of household income	8.60*	9.33*	15.65***	8.77*	8.77*		
Degree of urbanization	4.80	4.70	5.04	5.02	5.02	72.43***	51.91***
Education	7.11	6.76	10.16*	6.56	6.56	2.26	2.44

Standard errors (clustered by household) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
[#]RC denotes the reference category.

All results are given in proportional odds ratios, derived from the exponentiated ordered log-odds. These ratios give the increase in odds that one e.g. feels very strongly differences in income should decrease (answer category 5) versus the combined four other answer classes less in agreement with this statement (answer categories 1-4). As the odds are assumed to be proportional, the same interpretation holds for increases in odds that one responds either answer category 4 and 5 versus the combined three other answer classes less in agreement with this statement (answer categories 1-3).

Firstly, focusing on the differences between $F(y)$ and $F(y')$, one finds in specification (1), a ten-percentile increase in $F(y)$ significantly lowers the odds of being supportive of redistribution by a factor $0.097^{0.1} \approx 0.80$, or 20 percent, holding all other variables constant. The size of the coefficient on $F(y')$ in the specification (3) is significantly lower ($\chi^2 = 18.34$) compared to $F(y)$. A ten-percentile increase in $F(y')$ here is found to significantly lower the odds of being supportive of redistribution by a factor $0.261^{0.1} \approx 0.87$, or 13 percent, holding all other variables constant. Figure 3-8 gives the predicted percentage of respondents agreeing, neutral and opposing redistribution across $F(y')$ (in black) and $F(y)$ (in red), collapsing answer options 1 and 2, and answer options 4 and 5, and comparing specifications (2) and (3). Support for redistribution is predicted to be higher among those that perceive themselves to be high up in the income distribution compared to the predicted support for individuals that actually are in the upper spectrum of the income distribution. This support generally goes in favor of neutrality with regard to the statement. At the lower end of the income spectrum the inverse holds: those that actually are low income are more in support of redistribution compared to those that perceive themselves to be low income.
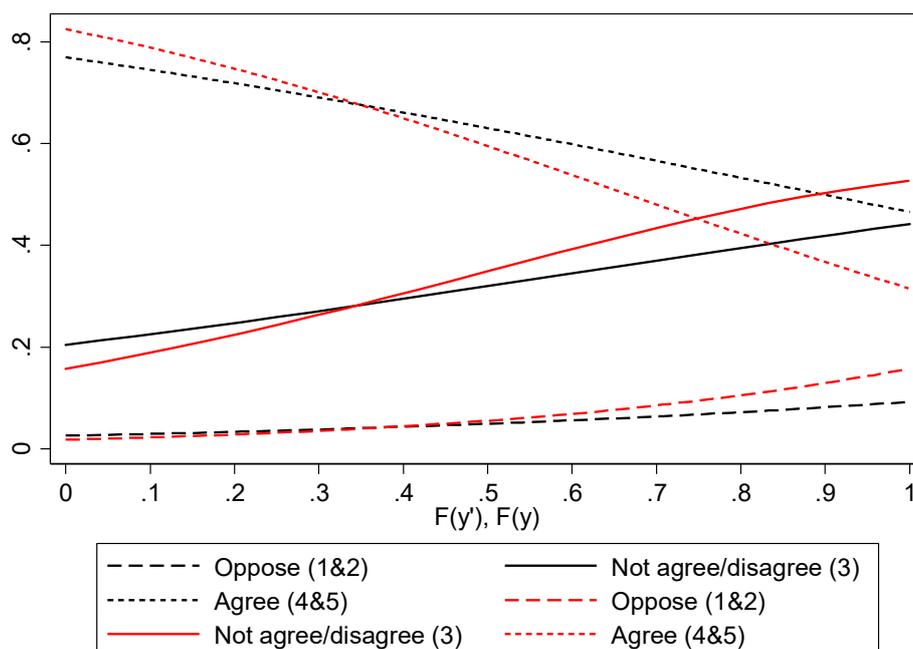
Figure 3-8: Predicted redistributive preferences by $F(y)$ and $F(y')$

Adding the dispersion of income σ'_y in specification (2) does not affect the coefficient on $F(y)$ significantly, although the variable itself is related to positively redistributive preferences (significant at the ten percent significance level). A 0.1 point increase in σ'_y increases the odds of being supportive by a factor of $2.393^{0.1} \approx 1.09$, or by nine percent, holding constant all other variables including one's income position. Given one's perceived location, perceptions of the dispersion of income no longer significantly affect the odds of being supportive of redistribution. In both specifications (2) and (3), the perceived location of the mean earner $F(\bar{y}')$ does not significantly influence one's preferences.

The MC-SDS measures social desirability in answering and shows this to be a cause for concern, as the odds for supporting redistribution rise with the propensity to give social desirable answers to an index of unrelated questions. Other studies using similar dependent variables should include such scales to control for social desirability in answering.

Interestingly, gender differences in support for redistribution significantly differ between specifications (2) and (3) ($\chi^2 = 9.53$) when using one's actual or perceived income position, being weaker in the latter case. Given $F(y)$, the odds of being supportive of redistribution on average is 39% higher for women, yet given $F(y')$, the odds of being supportive on average is higher by 30%. The explanation here may lie in the fact that on average males tend to overestimate their position more so than females do, as shown in the below graph. Controlling for gender in the MR framework therefore in effect may imply one is partially

controlling for men's tendency to overestimate their position. Such behavioral gender differences are not unknown to the literature, and have been found in for instance the assessment of math test performance (Bench et al. 2015), self-prediction of IQ test among students (Watts et al. 1997), and self-reported adult height (Cizmecioglu et al. 2005).
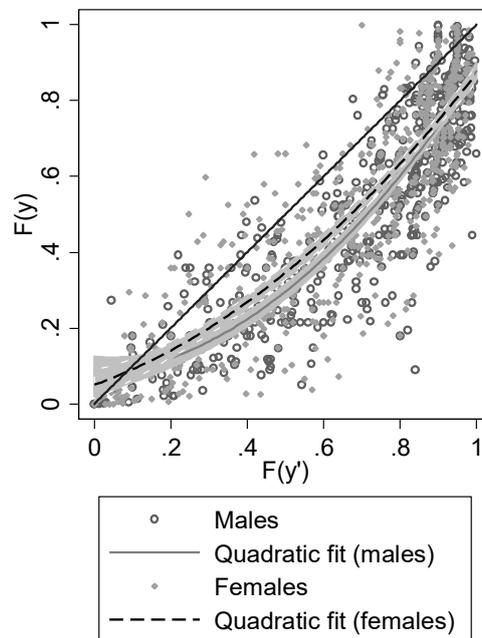
Figure 3-9: Respondents' estimation of income position by gender

While the above graph compares males and females across different types of households, a better test to see whether there is a male-female differential in overestimation can be obtained by comparing *within* household differences in $F(y')$, given the fact that household members by definition share the same $F(y)$. Household members that are either classified as head of the household or wedded or unwedded partners are compared, omitting same-sex couple households. The average difference between male and female $F(y')$ within households is -0.027 (SD: 0.14), which is relatively small, yet significantly different from zero (p=0.04), implying male household members estimate their household's income position 2.7 percentile points higher in the cumulative income distribution than their female counterparts do.

In all specifications age is shown to significantly affect redistributive preferences, with the odds of supporting redistribution growing with age. Opinions on work ethic (WORK) and number of people from foreign descent in the country (FOREIGN) are especially strong predictors of redistributive preferences, as shown by the joint F-tests on the dummy response coefficients. Compared to individuals prioritizing leisure to labor, the odds of supporting redistribution by those individuals finding work should always come first are between 62 and 66 percent lower. Compared to those in full agreement with the statement in FOREIGN, the

odds of supporting redistribution of income among those in full disagreement are around 4.2 times as great.

Those that claim to find politics difficult to understand (POLCOM) are significantly less likely to support redistribution, where the odds of support among those individuals are around 33% lower. Having a clear image of political issues (POLISS) is no significant predictor of RP. The variables measuring satisfaction with government are jointly insignificant in the case of GOVSAT, and only respondents very dissatisfied with government are more likely to prefer greater redistribution compared to those individuals neutral with regards to the statement. The causality here however is very likely to run in both directions and difficult to disentangle: Greater demand for redistribution may also lower satisfaction with current government, if government is felt not to act accordingly. Membership of a political party (POLMEM), level of political interest (POLINT), number of household members, nor the degree of urbanization of one's place of residence are significant predictors of RP, given all other variables. While jointly evaluations of satisfying levels of household income are significant in specifications (1) through (3), only weak effects are found relative to those individuals finding a €1,500 satisfying. Home ownership is a significant predictor of RP in specification (3) (at the 10% level), where the odds of supporting redistribution are 33% larger among renters, ceteris paribus. The effect however vanishes when using actual income position in the other specifications.

Based on the model performance, measured by the Akaike and Bayesian information criteria (AIC and BIC), and given the covariates throughout all models, the MR model in specification (1) is best able to explain preferences for redistribution. This is quite contrary to what one would expect: arguably, one's perceived position would hold superior information compared to one's actual position when determining one's preferences, as in many cases one's actual position is unknown to respondents. A possible explanation may hence be that the effect of income on preferences does not solely run through the subjective channel of $F(y')$, but also runs through objective factors, which are more likely to be associated with $F(y)$. One's social circle, neighborhood, work environment and one's socialization may for instance be more of a function of one's actual income position, rather than of one's perceived income position. This would also imply the effect of income on preferences does not solely result out of a self-interested calculus, as in the MR model, but rather in part stems from structural factors associated more with one's actual, rather than with one's perceived income position.

Testing the effect of over- or underestimation

While one's actual income position $F(y)$ is shown to be a better predictor of one's RP, does including $F(y')$ add information in explaining one's preferences? A potential problem hinted to above is formed by the high correlation between $F(y)$ and $F(y')$. This high correlation is partly tautological, as the highest income segment can by definition only either correctly estimate their position or underestimate it (the lowest income segment inversely can only correctly place themselves or overestimate their position). Given the general tendency of overestimation found above, this entails $F(y)$ and $F(y')$ generally overlap mostly in the top of the income distribution—a group found least likely to favor further equalization of incomes. The group correctly estimating their position hence is not a random sample of the population, but is a rather high income group. One should therefore in addition control for actual income position when estimating the effect of over- or underestimation.

In order to test the effects of over- and underestimation in an ordered logit model, two additional specifications are run. The first (specification 4) includes both $F(y)$ and $F(y')$ as predictors, while specification (5) rearranges the equation, including the difference $F(y') - F(y)$, while controlling for $F(y)$. Findings show there is insufficient evidence to reject the null hypothesis. Given one's actual position, one's perceived position is insignificant in determining one's preferences (following specification 5), or stated differently, given one's actual position, over- or underestimation, captured by $F(y') - F(y)$ is an insignificant predictor of RP. Based on the AIC, these specifications even perform worse than the MR specification (1).

Longitudinal evidence: Do changes in $F(y)$ over time affect RP?

The second wave of the *Value and Politics* survey can be used to estimate a First Differences regression (FD1 and FD2), testing whether the change in $F(y)$ over time, as well as changes in other time-varying variables can explain changes in preferences, in effect ridding the model of any time invariant characteristics of individuals not controlled for in the other specifications (e.g. one's social background or political worldview). Net household income y in period two is distributed according $\mu_2 = 7.79 = \mu_1$ and $\sigma_2 = 0.529$ (compared to $\sigma_1 = 0.522$), implying only a very marginal increase in inequality between the two periods. The change in income position, $\Delta F(y)$ on average is zero with a standard deviation of 0.066.

An ordered logit model is again fit to predict the change in RP between the first wave and the second wave. Unfortunately, as the survey on perceived distribution and location was only distributed once, the effect of changes in $F(y')$ cannot be estimated. Figure 3-10 (ΔRP is

jittered) shows a small number of outliers for $\Delta F(y)$ which may exert a strong effect on its coefficient, as shown by the naïve linear fit through the data. While controlling for the change in household size may partly pick up the effect of these outliers, a second set of regressions is run omitting these outliers (defined as the top and bottom one percentile).
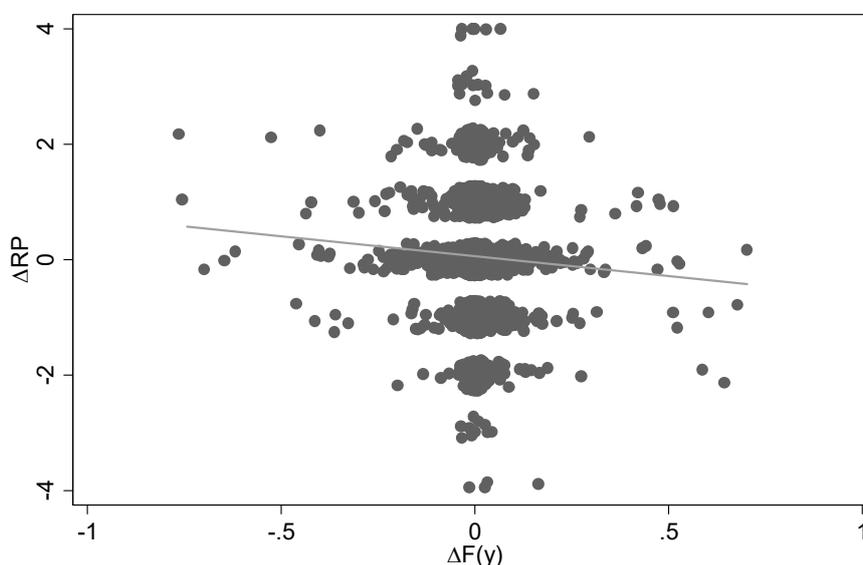
Figure 3-10: Relative changes in income position and changes in redistributive preferences

In both specifications (FD1) and (FD2), the coefficient on $\Delta F(y)$ is found to be significant at the five percent level and has the predicted sign. In FD1 the effect is weaker than the one found in specifications (1) and (2), yet after omitting the 80 outlier observations with large deviations in $F(y)$,[27] the coefficient is in line with those retrieved earlier. This finding using the within-unit change shows the effect from earlier specifications appears robust.

Cross-national evidence

The World Values Survey (WVS 2016) offers cross national evidence on beliefs about one's position in the income distribution $F(y')$. Respondents answer the question:

> *Here is a scale of incomes and we would like to know in what group your family is, counting all wages, salaries, pensions, and other income that comes in. Just give me the number of the group your household falls into before tax and other deductions.*

for which answers range from one to ten in discrete steps, and can hence be interpreted as the decile positions of respondents. If national surveys are taken among a representative sample of

---

[27] These are individuals increasing their position by more than 21.4 percentile points or decreasing it by more than 19 percentile points.

the population, the distribution of the variable by definition should be discretely uniform[28]. Deviations from uniformity hence can say something about the average perceptions of individuals regarding their positioning in the income distribution.[29] As unfortunately no data on actual income is available from the WVS, no individual-level statistics can be derived. Donelly and Pop-Eleches (2016) discuss the problems this approach poses for studies using the WVS.

The below histogram gives the empirical distribution of $F(y')$ for the Germany in 1997, 2006 and 2013. The expected distribution according to $F(y)$ would be uniform along the 10%-line. More respondents than expected however feel they belong to the middle income deciles. These more or less bell-shaped curves imply variances lower than expected, which is a pervasive finding across most countries in the WVS. This gives credence to Gimpelson and Treisman's (2014) assertion that both the rich and poor tend to believe they are closer to the median than in fact is the case. Furthermore, over time the skewness in the perceived distribution is decreasing, as respondents increasingly feel they are in the middle rather than just below the middle.
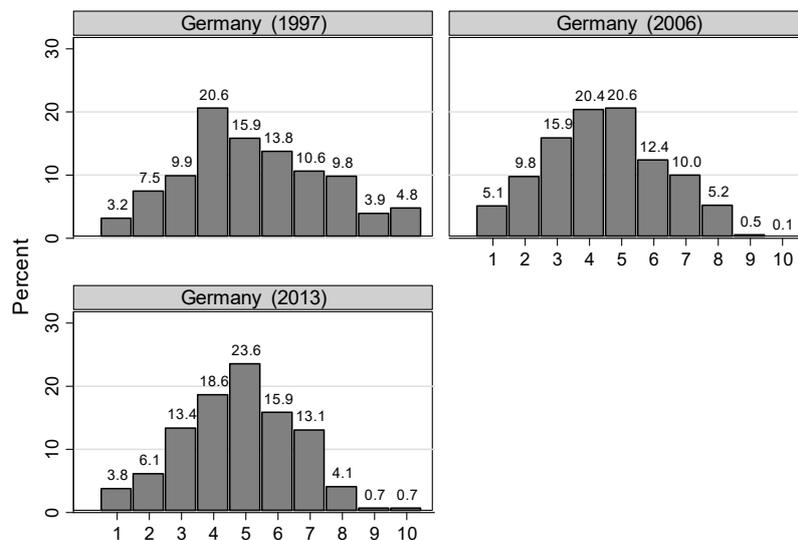
Figure 3-11: Perceived decile positions for Germany (1997, 2006 and 2013)

---

[28] The European Values Survey (EVS) and a number of country surveys in the WVS recodes its answers from answer options in national currencies, and are therefore omitted.

[29] If $F(y)$ is discretely uniformly distributed according to $F(y) \sim \text{unif}(1,10)$, its mean $\overline{F(y')}$ should be $11/2 = 5.5$ and its variance should be $(10^2 - 1)/12 = 8.25$. Any positive deviation from the predicted mean of 5.5 implies general overestimation of $F(y)$, while any negative deviation implies underestimation. Furthermore, while $\overline{F(y')}$ may approximate 5.5, lower variances indicate a bias towards the middle, where individuals at both ends tend to place themselves more towards the middle. Two additional test statistics can judge whether the distribution follows that of a uniform distribution: the χ^2 goodness-of-fit test and the Kolmogorov-Smirnov test. For all countries in the survey however, both tests strongly reject uniformity ($p = 0.000$).

The survey for the United States measured income position using dollar bins which approximated the actual ten income deciles in 1999, yet moved to the self-reported income deciles in 2006, as used for Germany. This change resulted in a major shift of the distribution, visible in Figure 3-12. In the left panel (1999) the distribution is more or less uniform. In the right panel (2006), there is a tendency to perceive oneself to be middle income. The correlation coefficients across both years between support for the following statement '*Place yourself on a scale from 1 (incomes should be made more equal) to 10 (there should be greater incentives for individual effort)*' and reported income decile are $\rho = 0.063$ in 1999 and $\rho = 0.103$ in 2006. It is however difficult to interpret these differences as an outcome of the differences between perceived and actual income, as in addition it may be the result of changes between the two time periods.
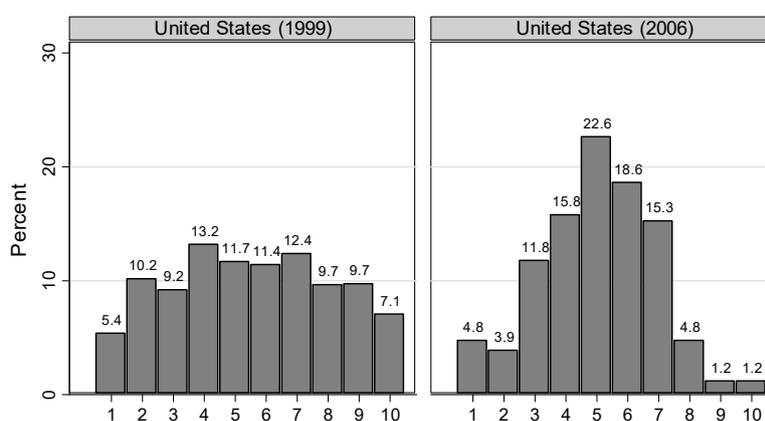
Figure 3-12: Actual (1999) and perceived (2006) decile positions for the United States

5. Conclusion

Among the first to explore the ways in which shortages of information undermine democracy's promise of net equality of influence for each citizen, Downs (1957: 94) suggested information shortages allow for unequal distributions of income, position in society, and influence to reign, 'inevitable in any economy marked by an extensive division of labor'. This contribution shows how two such distinct informational shortages can influence redistributive politics by affecting voters' preferences.

Misperceptions regarding the role of government and the distribution of income and one's position in it are demonstrated to affect redistributive preferences, having the power to alter the tradeoff in the election booth between the benefits of tax increases on government benefits and the decreases in disposable labor income that follow from such higher taxation. On the basis of this finding, one may argue that governments should actively provide accessible

information to the public regarding the public sector's impact. The tax authorities – by their nature gatherers of information on incomes – could furthermore provide citizens with information on the distribution of income, as well as on taxpayers' locations within this distribution. Such information is now already provided by the OECD through their 'Compare your Income' web tool, allowing individuals to test whether their perceptions of the income distribution align with reality.

This contribution demonstrates the equivalence between the outcomes of underestimating the redistributive capacity of government and overestimating one's position within the income distribution. As the former effect is difficult to measure and introduces problems regarding reverse causality (e.g. where political worldviews dictate one's views of government, and vice versa), the empirical section focuses on the latter, presenting a novel manner to distill one's self-placement in one's perceived distribution of net household income. Empirical findings however do show variables capturing one's understanding of the role of government are significant predictors of one's redistributive preferences.

Strong evidence is found for general overestimation of one's position in the distribution of net household income, while respondents on average are found to slightly overestimate its dispersion. Predicting redistributive preferences by alternatively using respondents' actual and perceived location in the income distribution, findings indicate one's actual rather than one's perceived income location has most predictive power in explaining attitudes regarding income equalization. Furthermore, and going against the theoretical predictions, given one's actual income position, over- or underestimating one's position does not significantly affect one's preferences.

These findings have implications for the Meltzer and Richard (1981) model which is still dominant in the literature. The effects most studies find when using one's actual income position may not merely pick up the effects of a self-interested calculus on behalf of voters, crucial in MR, as these could only run through one's perceived income location, but rather are likely to pick up (unmeasured) factors more strongly associated with one's actual, rather than with one's perceived income position. Such factors could include one's social circle, neighborhood or work environment, or lie in one's social background and socialization. While this study seeks to control for a range of such factors (e.g. including variables capturing one's housing situation or education), it is difficult to hold constant all factors both affecting one's redistributive preferences and correlating with one's actual, rather than one's perceived income position.

Future studies should acknowledge and explore the role of such indirect linkages between income and preferences, and further develop methodologies to analytically separate the perceived and actual income positions of respondents. A better understanding of the effects of different ways to ascertain respondents' incomes may help in understanding how preferences are formed. New surveys could combine actual income data with perceived locations implicitly derived from one's perceived distribution of income (as in LISS) and directly assessed from self-reported decile positions (as in WVS).

Chapter 4: **Equality of Opportunity in the United Kingdom, Germany and the Netherlands**[30]

Abstract: Using the framework of Roemer's theory of equality of opportunity, we investigate the extent to which the observed tax-and-transfer regimes of the UK, the Netherlands and Germany equalize opportunities for income acquisition among citizens over time. Optimal tax rates to equalize opportunities for different circumstances are calculated, providing a ranking of these circumstances in the degree to which they influence income attainment. The empirical analysis uses individual level data from national micro datasets. The extent to which the countries' tax-and-transfer regimes equalize opportunities across citizens in income attainment is largely determined by the labor supply elasticity and the definition of relevant circumstances. Only if the labor supply elasticity is high, results show the observed tax rates fare well in equalizing opportunities for income attainment. However, although pre-fisc equality of opportunity increases over the period under observation, the optimal tax rate to equalize opportunities remains higher than the observed rate.

1. Introduction

According to Ferreira and Peragine (2015: 2), Equality of Opportunity (henceforth EOp) is now 'the most prevailing conception of social justice in contemporary western societies'. Since the 1990s, considerations of individual responsibility and opportunity have been introduced into formal economic theories of the evaluation of social states. The economic literature on EOp builds explicitly on key contributions from philosophy, initiated by Rawl's *A Theory of Justice* (1971). The ideas of Rawls have been developed further, notably by Dworkin (1981a; 1981b), Arneson (1989), Cohen (1989) and Vandenbroucke (2001) where a new approach to egalitarianism transpired. Roughly speaking, the key feature of these new *responsibility-sensitive* egalitarian theories is the idea that an equitable society is not necessarily a society that ensures all its citizens are equally rich or educated, but rather a society that ensures all its citizens have equal opportunities to attain the outcomes they care about. This view constitutes a shift from equality of outcomes to opportunities. According to Roemer's theory of EOp, fiscal policy should redress those inequalities of income that arise due to circumstances beyond the individual's control, leaving inequalities arising due to choices for which individuals are deemed responsible untouched.

Identifying those circumstances which most hinder individual income attainment can be of important use when designing redistributive public intervention, as a means to prioritize those groups of society which are most in need and hence improve the target of such intervention. This paper firstly intends to evaluate the performance of the tax-and-transfer system of the UK between 1991 and 2008 with respect to the policy objective of EOp. After

---

demonstrating the method and its validity, the analysis is repeated for the Netherlands and Germany. Our empirical analysis firstly uses data from the *British Household Panel Survey* (BHPS), observing roughly 5,000 individuals from the UK for the time period of 1991 to 2008. Findings are compared to data from the Netherlands (LISS) and Germany (SOEP). Roemer et al. (2003) empirically examined the extent to which tax-and-transfer regimes equalize opportunities for income acquisition among citizens across eleven countries, including the UK for the year 1991.

The empirical analysis will apply this framework to different individual circumstances to investigate the extent to which these circumstances influence income acquisition across time and to compute the tax-and-transfer regime which would equalize opportunities, as far as possible, across citizens under each circumstance. Besides showing the evolvement of EOp in the UK, the Netherlands and Germany, at a methodological level our contribution to this literature is twofold. Firstly, we show how the estimated EOp policy parameters can be corrected for covariation. Covariation occurs when the disadvantaged group, for example all those with a low parental education, are also different in another relevant characteristic, for example their age. Not taking age into account may lead to over- or underestimation of the required EOp tax rate. Secondly, as the BHPS data also contains observed working hours, we investigate how well the derived optimal labor supply in Roemer's model aligns with actual labor supply and to what extent it affects the results.

The outline of the paper is as follows. Section 2 recapitulates the main features of Roemer's theory of equality of opportunity and presents the theoretical framework by formalizing the fiscal policy required to attain EOp. We use this framework to calculate both the observed and the equal opportunity policies, where a formalization of this model and a detailed description of the data are presented in sections 3 and 4. Section 3 furthermore outlines how Roemer's method can be adjusted when labor supply is observed rather than derived. Section 5 closes with a discussion of the results and the final conclusions.

2. Theoretical Framework

Roemer's theory of EOp seeks to identify policies which would equalize opportunities in domains such as income, education and health (Roemer 1993; Roemer 1998). Roemer distinguishes between two types of inequalities in outcomes: one deemed as ethically unacceptable and the other as justifiable. The former is related to an individual's circumstance. Circumstances are aspects of an individual's environment which are beyond his or her control and can aid or hinder the capacity to achieve a certain outcome. Individuals should therefore

not be held accountable for their circumstances and the inequalities that they cause should be compensated for by society. The inequality argued to be acceptable arises through one's efforts. It is the individual's choice and responsibility to exercise effort in order to attain an outcome, and this effort should be rewarded. Part of the challenge for equalizing opportunities then consists in deciding what is in the realm of the individual's responsibility and what lies outside and is thus considered a circumstance. In this paper, we will identify four different circumstances and rank them according to their impact on inequality of opportunity.

As noted by Roemer et al. (2003: 541), the theory revolves around five key concepts: types, circumstances, objective, effort and policy. Consider a population, divided into finite sets of types which comprise individuals with the same set of circumstances. The social planner desires to equalize the opportunities of individual attainment of the objective. The attainment of the objective is a function of the individual's effort, circumstances and the implemented social policy. Effort is assumed to be a choice variable to the individual, positively influencing the attainment of the objective, although this choice may be constrained by one's circumstances. The goal of the social planner is to find a policy which nullifies, to the greatest extent possible, the influence of circumstances on outcomes, whilst allowing outcomes to remain sensitive to effort. The challenge is not only in differentiating between what lies within and beyond the realm of the individual's control, but also the difficulty of comparing effort levels across different types where effort may itself be influenced by one's circumstances. For example, suppose children with a low parental educational background tend to exercise less on average than other children. If the objective is life expectancy, one may consider the weekly hours of physical exercise as an effort variable, but its distribution will differ across types. The individual's raw effort is therefore not an appropriate measure of effort as it is polluted by characteristics of the effort distribution of the respective type (see also Page and Roemer 2001: 4-5). Roemer et al. (2003: 543) propose to construct an inter-type comparable measure of effort, that is, the quantile where an individual sits in the effort distribution of his or her type. Individuals are ranked on the effort distribution of their type, where two people from different types that lie in the same quantile of the effort distributions of their respective types are considered to expend the same level of effort. The use of the quantile measure of effort therefore removes the effect of circumstances on the distribution of effort across types, allowing to make comparisons of the degree of expended effort across types. Individuals are then to be held accountable for only the relative degree of expended effort and not the absolute levels of effort. The policy instrument succeeds in equalizing opportunities if individuals of different types who are at the same quantile of their respective effort distributions sit at the same quantile of the

outcome distribution. Following this argument, EOp of a certain objective is attained when the distributions of the objective are identical across types.

Equalizing opportunities through income taxation and transfers

This section will briefly recapitulate the methodology of equalizing opportunity through income taxation and transfers as set out in Roemer et al. (2003). Let *type*, $z \in Z$, define a set of persons with the same circumstances. Individuals are partitioned into several types, characterized by their circumstances which may be social, genetic or biological. *Effort*: $\pi \in [0,1]$, is an individual choice variable which positively influences the outcome. *Policy*: $\varphi \in \phi$, is the opportunity-equalizing policy φ chosen from the set of feasible policies, ϕ. Individual attainment of the objective, in this case income acquisition, is influenced by their respective circumstances, degree of effort, and the applied policy. In this analysis, the policy is characterized as a tax-and-transfer system mapping pre-fisc (x) to post-fisc income (y). The generic policy applied is the pair (t, c), where $y = (1 - t)x + c$ is post-fisc income under policy (t, c). Each type has a distribution of the value of the objective, in this case post-fisc income. The *objective* $v^z(\pi, \varphi)$ is the value of the objective of an individual who is at the πth quantile of the effort distribution in type z under policy φ.

If net income is taken as the objective, then EOp seeks the fiscal policy φ which equalizes, as far as possible, the distributions of post-fisc income across types at any degree of effort (or effort quantile π) by solving the following problem:

$$\max_{\varphi \in \phi} \int_0^1 \min_z v^z(\pi, \varphi) d\pi \tag{1}$$

Basically, the maximin procedure described by (1) first requires to identify the most disadvantaged type and then to select the tax-and-transfer policy which maximizes the average value of the objective for this type. Given a fiscal policy (t, c), $y = (1 - t)wL + c$ is the post-fisc income of an individual with wage w and labor supply L. A uniform, quasi-linear utility function is assigned to each individual:

$$u(y, L) = y - \alpha L^{1 + \frac{1}{\eta}} \tag{2}$$

with η the elasticity of labor supply with respect to wage. The optimal labor supply for individuals earning wage w and facing fiscal policy (t, c), where $\hat{\alpha} = \alpha(1 + 1/\eta)$, is:

$$L^* = \left[\frac{(1 - t)w}{\hat{\alpha}} \right]^{\eta} \tag{3}$$

and the associated pre-fisc income is:

$$x = wL^* = \left[\frac{(1-t)}{\hat{\alpha}}\right]^{\eta} w^{1+\eta} \tag{4}$$

The government's balanced budget constraint, with $f(w)$ as the density function of wages, is:

$$t \int \left[\frac{(1-t)}{\hat{\alpha}}\right]^{\eta} w^{1+\eta} f(w)dw = f = c + g \tag{5}$$

The left hand side of (5) shows that government revenues are raised taxing gross income ($x = wL$) by a flat rate t. On the right hand side are government expenditures, composed of per capita lump sum transfer c and non-transfer spending g. Solving for c, we then have:

$$c = t \left[\frac{(1-t)}{\hat{\alpha}}\right]^{\eta} B - g \tag{6}$$

with $B = \int w^{1+\eta} \, dF$

Taking type 1 as the most disadvantaged group (defined by the circumstance), the average post-fisc income of the most disadvantaged group at policy (t,c) is:

$$\bar{y}_1 = (1-t)\left[\frac{(1-t)}{\hat{\alpha}}\right]^{\eta} A + t \left[\frac{(1-t)}{\hat{\alpha}}\right]^{\eta} B - g \tag{7}$$

with $A = \int w^{1+\eta} \, dF_1$, dependent on the distribution of wages of the worst-off group.

The tax rate which maximizes tax revenues is $t = 1/(1+\eta)$. The EOp policy requires to maximize the value of post-fisc income $\bar{y}_1$ with respect to t, which gives the EOp policy $\varphi(t^{\text{EOp}}, c^{\text{EOp}})$ with:

$$t^{\text{EOp}} = \max\left[1 - \frac{\eta B}{(1+\eta)(B-A)}, 0\right] \tag{8}$$

B will typically be larger than A so that $t^{\text{EOp}} > 0$. However, if $A > B/(1+\eta)$, i.e. if the distribution of wages of the worst-off group (A) does not differ greatly from the distribution of wages of society as a whole (B), the equal opportunity tax will be zero. Generally, the higher η, the more A can be below B while still ending up with a zero t^{EOp}. Stated otherwise, if pre-fisc inequality of opportunity is rather limited and η high, taxation would be counterproductive given the incurred deadweight loss.

As presented above, the wage distributions are used to compute the equal opportunity tax. Roemer et al. (2003) explain how these wage distributions are computed using the observed pre-fisc income. The assumption is made that pre-fisc income is produced by individuals which maximize utility, given their wage earning capacity w. At the observed policy t^{obs}, income must then be related to wages by the following relation, as defined in (4):

$$x^{\text{obs}} = \left[\frac{1 - t^{\text{obs}}}{\hat{\alpha}}\right]^{\eta} w^{1+\eta} \tag{9}$$

where α is calibrated assuming that the individual with median income x_m works one unit of time, which using (4) implies $\hat{\alpha} = (1 - t^{\text{obs}})w_m$. This relation can then be inverted to find the distribution of wages, F, which will be used to calculate the optimal EOp fiscal policy.

From (9) follows that $w_i^{1+\eta} = x_i^{\text{obs}} w_m^{\eta}$, which makes it possible to express t^{EOp} as a function of gross incomes. We rewrite A and B as follows, where $\bar{x}$ represents mean gross income, and $\bar{x}^1$ represents the mean gross income of the most disadvantaged group:

$$B = \int w^{1+\eta}\, dF = \int x_i^{\text{obs}} x_m^{\eta} f(x)\, dx = x_m^{\eta} \int x_i^{\text{obs}} f(x)\, dx = x_m^{\eta} \bar{x}$$

$$A = \int w^{1+\eta}\, dF_1 = \int x_i^{\text{obs}} x_m^{\eta} f(x)\, dx_1 = x_m^{\eta} \int x_i^{\text{obs}} f(x)\, dx_1 = x_m^{\eta} \bar{x}^1 \tag{10}$$

Substitution then yields a second definition of t^{EOp}:

$$t^{\text{EOp}} = \max\left[1 - \frac{\eta \bar{x}}{(1 + \eta)(\bar{x} - \bar{x}^1)}, 0\right] \tag{11}$$

The actual tax regime is compared to the EOp regime and to a benchmark policy, with $c = 0$. The benchmark policy is the rate at which pre-fisc income is to be taxed to raise just sufficient government revenues to fund non-cash, in-kind expenditures (g), but zero cash transfers. To determine g, set $c = 0$ in (6) which when using $\hat{\alpha} = (1 - t^{\text{obs}})w_m$ gives $g = aB/w_m^{\eta}$. Under the benchmark policy, $\bar{y}_1^{\text{bench}}$ is the average post-fisc income of the worst-off type, defined by the relevant circumstance. Similarly, $\bar{y}_1^{\text{obs}}$ is defined as the average post-fisc income of the worst-off type at the observed policy and $\bar{y}_1^{\text{EOp}}$ at the EOp policy (each post-fisc income estimate is obtained using (7) under each tax policy). The index to measure the degree to which fiscal policy equalizes opportunities for income acquisition, relative to the benchmark policy, is defined by Roemer et al. (2003: 548-9) as:

$$v = \frac{\bar{y}_1^{\text{obs}} - \bar{y}_1^{\text{bench}}}{\bar{y}_1^{\text{EOp}} - \bar{y}_1^{\text{bench}}} \tag{12}$$

The value of v is the extent to which the observed policy equalizes opportunities, with the extremes of $v = 1$ when the observed policy is the EOp policy and $v = 0$ when the observed policy is the benchmark policy.

The final step is to calculate the efficiency costs or gains ε of achieving EOp, that is, to see the loss or increase in average incomes if the optimal tax policy was to be enacted. Efficiency is then defined as the ratio of average pre-fisc income at the EOp policy and the

observed policy. Values for $\varepsilon < 1$ indicate an efficiency cost when moving from the observed policy to the EOp policy.

$$\varepsilon = \frac{\int x(w; \varphi^{\text{EOp}})dF(w)}{\int x(w; \varphi)dF(w)} \tag{13}$$

3. Data and method

In light of the discussed theory, the objective of the empirical part of this study is to investigate the extent to which the fiscal system of the United Kingdom, the Netherlands and Germany equalizes opportunities for income acquisition under different circumstances. This entails firstly to identify the existing tax-and-transfer system, and subsequently the opportunity equalizing fiscal policy under each circumstance, in order to judge to what extent the observed policy equalizes opportunities in the acquisition of income. This will be investigated for different sets of circumstances.

Data

The empirical analysis firstly employs individual data from the original sample of the *British Household Panel Survey* (BHPS 2009). This sample is representative of the British population (excluding Northern Ireland and North of the Caledonian Canal), and in the first wave consisted of 5,050 households and 9,092 individuals. In addition to extensive information on income and individual characteristics, the BHPS contains a range of variables on the background of respondents which will be used to classify types. The sample has been restricted to prime aged adults of 25 to 50 years and contains over 60,000 observations, where the average age is 38. The same method is later applied to two additional country datasets, the LISS (2016) panel for the Netherlands and the SOEP (2014) panel for Germany.

The outcome variable of this analysis is individual post-fisc income. Pre-fisc income for the United Kingdom is calculated using the individual's annual labor income, for which the BHPS contains a measure. The measure for individual net income from labor however had to be estimated. To this end, the BHPS was merged with the *Derived Current and Annual Net Household Income* dataset (Bardasi et al. 2012), which provides derived household net income variables for the BHPS. Individual annual net income from labor ($\hat{y}_i$) was derived using the ratio of gross individual (x_i) to gross household annual labor income (x_{hh}), assuming this same ratio holds with net household income (y_{hh}),[31] according to (14). All income variables are expressed annually in British pounds.

---

[31] For annual net household income, we take total annual net income minus annual investment income.

$$\hat{y}_i = \frac{x_i}{x_{\text{hh}}} \cdot y_{\text{hh}} \tag{14}$$

Dutch data contains individual (imputed) net and gross income data, and does not require further computations, as necessitated in the British data. Income data is collected on a monthly basis and data runs between July 2008 and March 2016. The German income data is at the household level, but equivalized, thus correcting for the number of household members (specifically, divided by the square root of the number of household members). This approach corrects for scale economies in the household. These differences in income definition may however hamper direct comparison between the countries and hence findings should be cautiously interpreted.

In order to analyze EOp for income attainment, the types are partitioned using information on individual circumstances available in the datasets. These measures for the United Kingdom include the educational qualifications (PED) and occupations (PSEC) of respondents' parents, respondents' gender and the type of school the respondent attended. We exploit the panel nature of the dataset, as for certain circumstances questions were only posed in a select number of waves. As these circumstances pertain to individual-level constants, such as gender, we can use the answers respondents gave in one wave to define this respondent's type in all waves. For circumstances related to parental background, we use highest educational qualification and occupation between both parents. Table 4-1 shows levels for $\bar{x}$ and $\bar{x}^1$ when partitioning individuals into the four main typologies.

Table 4-1: Average income $\bar{x}^1$ and $\bar{x}$ (in current GBP) for four circumstances.

	Gender		PED		PSEC		School type	
	A (♀)	B (All)	A (Low)	B (All)	A (Low)	B (All)	A	B (All)
1991	5652	9574	8371	9486	8386	9731	8331	9583
	(2604)	(4888)	(612)	(1631)	(1762)	(4619)	(1867)	(4849)
1995	7434	11451	9665	11405	9892	11964	9725	11876
	(2124)	(3860)	(676)	(1977)	(1138)	(3116)	(1162)	(3324)
1999	8679	12900	11581	13286	11357	13456	10838	13504
	(1872)	(3412)	(746)	(2330)	(873)	(2356)	(791)	(2503)
2003	11219	16319	14185	16655	14540	17092	14866	17232
	(1587)	(2918)	(823)	(2755)	(584)	(1656)	(465)	(1760)
2007	13570	19025	16932	20105	16190	20025	17564	20339
	(1326)	(2428)	(528)	(1948)	(366)	(1064)	(248)	(1139)

Results are displayed for a selected number of years. Number of observations are in parentheses. Due to missing observations for certain variables, estimations of B slightly differ between the typologies. There are no missing observations for gender, hence making these estimations of B those for the entire sample. Panel attrition explains the lower number of observations in later years.

For the Netherlands similar circumstances are defined, specifically gender, highest educational qualification between both parents, parental occupation (mother and father), and origin (either autochthonous, or first or second-generation foreign with either a Western of non-western

background). Individuals with net or gross incomes larger than €10,000 a month are omitted, as are individuals changing their origin or gender over time, both likely resulting from data errors. For Germany, included circumstances are sample status (belonging to either the East or West German sample), parental occupation and parental education. The choice of equivalized income implies that household members not on the labor market and hence with a zero gross income are now assigned a fraction of total household income. This strategy thereby is found to equalize differences across gender to such a degree that EOp is achieved by construction when using gender as a circumstance. Regional price differences are not taken into account.

Method

The empirical strategy largely mirrors Roemer et al. (2003) in the calculation of the optimal EOp policy. The following steps were undertaken:

1. *Identification of observed taxation policy*

In order to obtain estimates of the actual mapping of pre-fisc income (x_i) into estimated post-fisc income ($\hat{y}_i$), post-fisc income is regressed on pre-fisc income for each year:

$$\hat{y}_i = \beta_0 + \beta_1 x_i + \varepsilon_i \tag{15}$$

The estimated value of β_0 is the observed value of the lump-sum household transfers (c^{obs}) and that of β_1 is one minus the observed value of the tax rate ($1 - t^{obs}$). All types are taxed at the same rate which means there is no change of rank between pre- and post-fisc income distributions and no change in rank position between types. These regressions are run for each year under analysis to calculate the observed tax-and-transfer regime.[32] Finally, the difference between average pre-fisc and average post-fisc income under the observed fiscal policy is taken as an approximation of per capita government expenditures, g, as expenditures on public goods are financed by taxing pre-fisc incomes while not contributing to post-fisc incomes. In other words, taxation and redistributing the revenues in the form of lump sum cash transfers does not drive a wedge between mean gross and net income, whereas taxation of gross income to fund non-cash, in–kind expenditures causes mean pre-fisc income to be higher than post-fisc income.

2. *Division into types*

Identifying all circumstances that influence income acquisition is clearly beyond reach. In practice, only some of these circumstances are observable and can be identified, which are then used to define and partition the types. The EOp policy will therefore tend to undercompensate

---

[32] On the basis of Cook's distance estimates (where Cook's $D > 1$), we drop influential outlier observations which exert high leverage and hence distort our tax estimates.

those individuals with disadvantageous circumstances (Roemer et al. 2003: 542), as effort is considered as the entire residual (for example, luck and natural ability are not accounted for and therefore enter the effort residual along with other, unidentified or unobservable, circumstances).[33]

Sometimes covariates are likely to both influence the probability of belonging to a type and explain variation in pre-fisc income. Without controlling for such variables, estimates of t^{EOp} may be biased. To take school type as an example, even in our restricted sample of British individuals between 25 to 50 years, the average age of individuals which attended secondary modern school is far lower than the average age of individuals that attended comprehensive school. Such differences in age are likely to play out in the estimation of the respective types' mean pre-fisc income (e.g. due to differences in job tenure). We therefore propose a second estimation $t_{\text{corr}}^{\text{EOp}}$, where we have corrected for group differences in income predictor variables such as age. Above we defined $B = \int w^{1+\eta} dF$ and $A = \int w^{1+\eta} dF_1$. We can always find a vector of β, such that:

$$A = E(X_1)' \beta_1$$
$$B = E(X)' \beta \tag{16}$$

where in our case X_1 contains the age of respondents belonging to the worst-off group 1 and β^1 gives the vector of coefficient such that $E(X_1)' \beta_1 = A$. Similarly, X contains the age of all respondents, where β gives the vector of coefficients such that $B = E(X)' \beta$. Applying a two-fold Blinder–Oaxaca decomposition (see e.g. Neumark 1999; Oaxaca 1973), we then substitute these equalities for A and B into (8), which gives:

$$t^{\text{EOp}} = \max\left[1 - \frac{\eta\{E(X)'\beta\}}{(1+\eta)\{E(X)'\beta - E(X_1)'\beta_1\}}, 0\right] \tag{17}$$

which can be decomposed into:

$$t^{\text{EOp}} = \max\left[1 - \frac{\eta\{E(X)'\beta\}}{(1+\eta)[\{E(X)'(\beta - \beta_1)\} + \{E(X) - E(X_1)\}'\beta_1]}, 0\right] \tag{18}$$

We define $U = \{E(X)'(\beta - \beta_1)\}$ as the unexplained outcome differential, which we can argue to directly follow from inequality of opportunity. We however want to correct for the outcome differential which can be explained by differences in predictors between types, defined as $Q = \{E(X) - E(X_1)\}'\beta_1$. The estimate of the corrected EOp tax rate is therefore:

$$t_{\text{corr}}^{\text{EOp}} = \max\left[1 + \frac{\eta\{E(X)'\beta\}}{(1+\eta)[U]}, 0\right] = \max\left[1 + \frac{\eta\{E(X)'\beta\}}{(1+\eta)[E(X_1)'(\beta_1 - \beta)]}, 0\right] \tag{19}$$

---

[33] This component of luck is however argued to average out across individuals.

In cases where a circumstance is orthogonal to the variables in X, $E(X) \equiv E(X_1)$, and thus $t_{corr}^{EOp} = t^{EOp}$. We present our results using both estimations of the required EOp tax rate.

3. *Calculation of the optimal taxation policy*

The next step is to simulate the opportunity-equalizing tax policy that tries to equalize the expected post-fisc income between different types. Simulations are made using a wage elasticity of labor η of 0.06, in line with Roemer et al. (2003: 549). Generally, the smaller the labor supply elasticity, the smaller the disincentive effects of taxation, and hence the higher the EOp tax rate will be. The opportunity equalizing fiscal policy is then calculated under each circumstance by maximizing the average post-fisc income under policy (t, c) for the most disadvantaged type.

4. Results

The left panel of Figure 4-1 shows differences in the distribution of pre-fisc income for gender in the United Kingdom for the year 1991. Pre-fisc income distributions across different types are unlikely to be identical unless educational and other pre-fisc polices have effectively made up for disadvantageous circumstances that individuals face (Roemer et al. 2003). Tax-and-transfer systems can therefore play an important role in levelling the playing field in income acquisition and rectifying the existent inequality. The equal opportunity fiscal policy aims to align the distributions of post-fisc income as much as possible, thus equalizing opportunities in income acquisition across types. Following the applied framework the policy maker thus seeks a policy which maximizes the area to the left of the post-fisc distribution function of the most disadvantaged type, which is bounded by the axes and line $F = 1$ (Roemer et al. 2003: 546).

To illustrate the importance of identifying relevant circumstances, the right panel of Figure 4-1 shows a partitioning of the British sample by the arbitrary variable odd or even survey identification numbers as the individual circumstance. As expected, the distribution functions of pre-fisc income are identical. This highlights the importance of choosing relevant circumstances beyond individual control which hinder or aid the attainment of pre-fisc income across individuals.
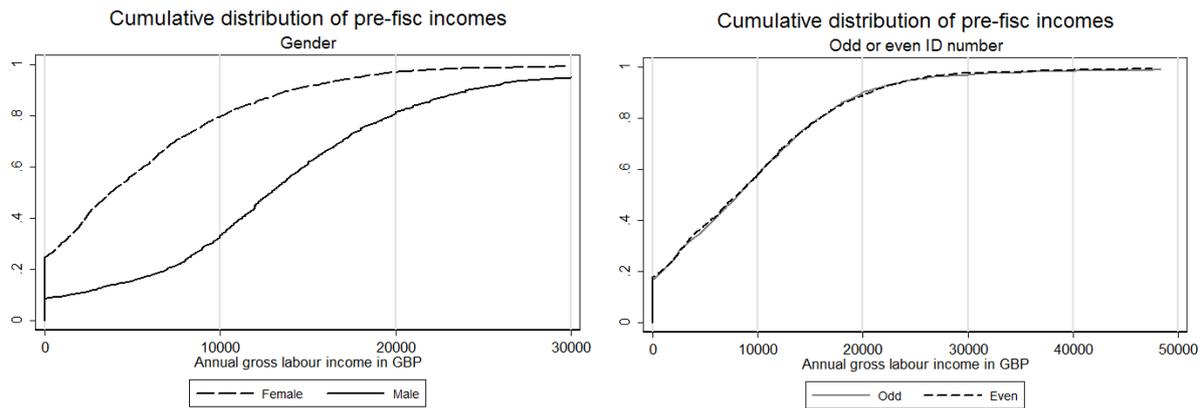
Figure 4-1: Cumulative distribution of pre-fisc income by gender and odd or even ID number (1991)

Table 4-2 – Table 4-5 below present the calculations for differently defined types under the assumption of $\eta = 0.06$ for the 18 years of the time period under analysis in the United Kingdom. Table 2 includes the calculations of t^{obs} and c^{obs}, which are the regression coefficients of the best fitting line $y = (1 - t)x + c$, and t^{bench} which is the proportional tax rate just sufficient for non-transfer government expenditures. Under the observed UK fiscal policy, the effective tax rate is around 30 percent, noting the UK spends around ten percent of national income on government services. The difference between t^{obs} and t^{bench} represents the part of income taxation used for redistribution.

Table 4-2 further presents the calculations when defining types by the circumstance of gender. As one's gender is the outcome of a biological lottery, we have no a priori concerns for biasing covariates which could determine the probability of belonging to either gender and income. In other words, all differences in the attainment of income stemming from gender can be thought to follow from belonging to either one of the sexes, and will not (partly) stem from the fact that the likelihood of belonging to either gender is in part determined by a third variable, which in addition can explain differences in income attainment. Indeed, our calculation of t^{EOp} and $t^{\text{EOp}}_{\text{corr}}$, show they are identical in all years. Below, for different circumstances, we will see that covariates may be a legitimate concern.

We find that pre-fisc EOp, reported in the p column, is very low for the earlier years of analysis, where the average pre-fisc income of the worst-off type (females) is less than half of the average pre-fisc income of the best-off type (males). This ratio increases to just above 50 percent in later years. The increase in pre-tax EOp is partly reflected in the decline of the optimal equal opportunity tax, t^{EOp} declining by just over 5 percentage points over the time period. The v column reports the distance between the observed fiscal policy and the equal opportunity policy. We can see how this parameter increases over the twenty years under

analysis where, by 2008, the observed policy achieves equalization of opportunity to a degree of 83 percent. The efficiency ratio, ε, slowly increases over time, where efficiency costs ($\varepsilon < 1$) in terms of national income from moving towards the EOp tax rate are around 7 percent in 2008. The efficiency costs of moving to this very high tax rate are relatively small, as we operate under the assumption of a low labor supply elasticity ($\eta = 0.06$). Labor supply thus reacts very little to tax increases, and hence the costs of implementing the equal opportunity policy in terms of individual labor earnings are small. Below, we present results under different assumptions about η. Note that although t^{EOp} declines, v increases, which can only happen if p has increased, that is, a decline in t^{EOp} still gives a higher value for v due to a decline in pre-fisc inequality of opportunity.

Table 4-2: EOp policy using gender as circumstance ($\eta = 0.06$)

	t^{obs}	c^{obs}	t^{bench}	t^{EOp}	c^{EOp}	v	ε	p	q	q^{EOp}
1991	0.31	1260	0.11	0.86	6441	0.68	0.91	0.40	0.47	0.86
1992	0.30	1383	0.09	0.85	6934	0.71	0.91	0.44	0.50	0.87
1993	0.30	1529	0.08	0.84	7219	0.72	0.91	0.44	0.52	0.86
1994	0.32	1706	0.10	0.84	7313	0.76	0.92	0.46	0.53	0.86
1995	0.32	1696	0.10	0.84	7671	0.75	0.92	0.45	0.53	0.86
1996	0.33	1776	0.11	0.84	7845	0.76	0.92	0.46	0.53	0.86
1997	0.32	1863	0.11	0.84	8161	0.76	0.92	0.46	0.53	0.86
1998	0.31	1791	0.11	0.83	8187	0.75	0.92	0.46	0.53	0.86
1999	0.31	1971	0.10	0.83	8531	0.76	0.92	0.48	0.55	0.86
2000	0.31	2204	0.10	0.83	9416	0.76	0.92	0.48	0.55	0.86
2001	0.32	2364	0.11	0.82	9904	0.78	0.92	0.49	0.57	0.86
2002	0.32	2662	0.11	0.82	10463	0.79	0.92	0.50	0.58	0.86
2003	0.33	2870	0.09	0.82	10877	0.80	0.92	0.50	0.58	0.86
2004	0.34	3063	0.11	0.81	11101	0.82	0.93	0.52	0.60	0.86
2005	0.34	3102	0.11	0.81	11435	0.82	0.93	0.52	0.60	0.86
2006	0.34	3403	0.10	0.80	11823	0.84	0.93	0.53	0.61	0.86
2007	0.34	3477	0.10	0.80	12391	0.83	0.93	0.53	0.61	0.86
2008	0.35	3784	0.10	0.80	12820	0.83	0.93	0.52	0.61	0.86

The final columns q and q^{EOp} report post-fisc inequality of income respectively. These are calculated, as the ratio of the average post-fisc income of the lowest type to the average pre-fisc income of the highest type under the observed fiscal policy in the case of q and under the EOp policy in the case of q^{EOp}. Under the EOp tax, as expected, there is a much higher equality of post-fisc income, where female's average post-fisc income is around four-fifths that of males. Figure 4-2 shows the extent to which each of the fiscal policies equalize the distribution functions of post-fisc income across types defined according to gender, for the year 1991 (where differences are greatest). As expected, the equal opportunity fiscal policy narrows the gap between the distribution functions of post-fisc income across types – equalizing, as far as possible, opportunities for income attainment where the remaining differences in income are due to differential effort.

In order to better grasp changes in the EOp tax over time, as noted above, we take the total differential of (8) with respect to A and B, which gives:

$$dt^{\text{EOp}} \lesseqgtr 0 \quad \Leftrightarrow \quad \frac{\eta(1+\eta)}{[(1+\eta)(A-B)]^2}\{AdB - BdA\} \gtreqless 0 \tag{20}$$

We can rewrite this to the following inequality, implying it is the relative degree to which income of the worst-off group (A) changes compared to how income of society as a whole (B) changes, which causes EOp to either increase or decrease over time:

$$dt^{\text{EOp}} < 0 \Leftrightarrow \frac{dA/A}{dB/B} > 1 \tag{21}$$

Basically, (21) shows that if the worst-off group (e.g. in this case females) catch up, that is their mean income rises faster than mean income of the whole population, then t^{EOp} will fall. A rising tide of economic growth lifting all boats is only conducive to EOp if the rising tide lift certain boats (i.e., A's) more than others.
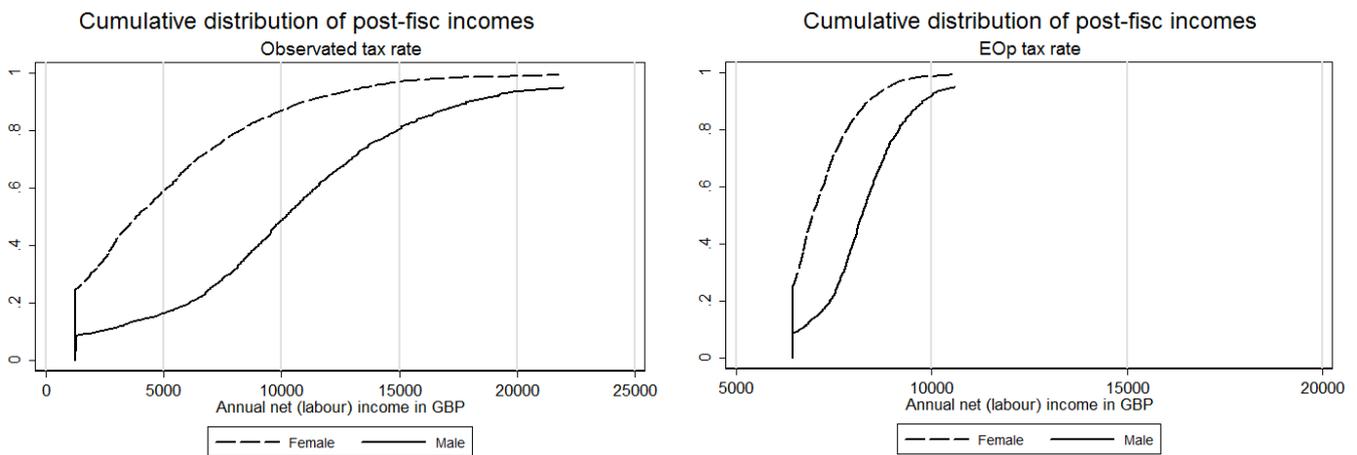
Figure 4-2: Post-fisc income cumulative distributions under observed and EOp fiscal policy by gender (1991)

Figure 4-2 and the first panel of Figure 4-1, which portrays the cumulative distribution of pre-fisc incomes, indicate males on average are more active on the labor market, shown by the vertical section along zero labor income. Traditional household roles may account for a large part of this variation, implying part of the inequality of opportunity does not stem from gender per se, but from outcomes certain social norms can have through gender. Though ideally we would discern between both aspects, we could argue, as does Roemer (1998), that the distribution of effort levels in each type is itself a characteristic of the type.

Table 4-3 presents the results when defining types by the type of school attended. Those who attended grammar or private schools have on average a higher pre-fisc income than the

worst-off group who attended secondary modern schools.[34] Figure 4-3 shows between 1991 and 2007 this group significantly differs from the mean age of all respondents, on average, being around three years younger.[35] As this fact may distort our estimation of mean income B, we correct for age using the Blinder-Oaxaca approach outlined above.
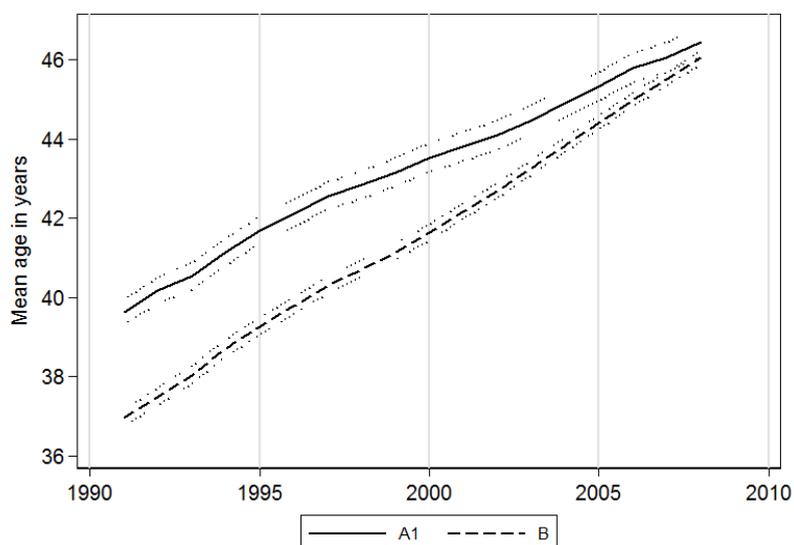
Figure 4-3: Mean age for A and B by year for school type (with 95% confidence intervals)

Table 4-3: EOp policy using type of school attended as circumstance ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	t_{corr}^{EOp}	c_{corr}^{EOp}	v	ε	p	q	q^{EOp}
1991	0.57	4231	0.63	4761	0.98	0.96	0.65	0.69	0.81
1992	0.66	5523	0.70	5875	0.94	0.95	0.60	0.65	0.83
1993	0.69	6163	0.72	6372	0.92	0.95	0.54	0.59	0.80
1994	0.65	5944	0.67	6127	0.95	0.96	0.46	0.52	0.71
1995	0.69	6653	0.68	6602	0.93	0.96	0.48	0.53	0.74
1996	0.71	7032	0.70	6946	0.92	0.95	0.54	0.60	0.80
1997	0.68	7047	0.67	6880	0.94	0.96	0.58	0.63	0.80
1998	0.69	7205	0.66	6852	0.93	0.96	0.60	0.65	0.82
1999	0.71	7850	0.69	7547	0.91	0.95	0.54	0.60	0.79
2000	0.65	7783	0.60	7217	0.95	0.97	0.55	0.60	0.76
2001	0.59	7572	0.54	6826	0.97	0.98	0.60	0.65	0.77
2002	0.58	7919	0.55	7361	0.97	0.98	0.63	0.69	0.79

[34] One may consider one's choice of school type a choice rather than a circumstance. Can we however define school type as a circumstance? Dworkin's (1981) competing theory of Equality of Resources would argue if one's choice of school type follows from one's preferences, one should be held accountable for that action. 'According to Dworkin's view', writes Roemer (1998: 19), 'the type 1 young person who cuts school because she has a distaste for it—a distaste not uncommon among those of her type—would be accountable for that action, as long as she identifies with her preferences, is glad she has them, and sees no reason to change them.' Roemer disagrees, in turn claiming her preferences may be merely what she falsely deems to be necessity, and hence would argue one's school type to be a circumstance, fitting within the EOp framework.

[35] The early tripartite system of state funded secondary school education in the UK was made up of grammar schools, secondary technical and secondary modern schools. Allocation was based on pupils' performance in an examination. As this system has since been abolished and today comprehensive schools are in place, the observed differences in the mean ages of respondents between the groups are likely a function of these institutional changes.

	t^{EOp}	c^{EOp}	$t_{\text{corr}}^{\text{EOp}}$	$c_{\text{corr}}^{\text{EOp}}$	v	ε	p	q	q^{EOp}
2003	0.59	8361	0.58	8293	0.97	0.97	0.58	0.64	0.77
2004	0.64	9414	0.65	9553	0.96	0.96	0.59	0.65	0.80
2005	0.57	8480	0.59	8824	0.98	0.97	0.60	0.66	0.77
2006	0.66	10550	0.64	10337	0.96	0.96	0.50	0.57	0.74
2007	0.59	9761	0.58	9741	0.98	0.97	0.57	0.63	0.75
2008	0.60	10591	0.59	10409	0.97	0.97	0.53	0.60	0.73

We find a $t_{\text{corr}}^{\text{EOp}}$ of on average 0.64, roughly twice that of t^{obs}. The uncorrected estimates for t^{EOp} are shown to generally be downward biased in the earlier years, while in later years they show an upward bias. The income of the worst off group consisting of former secondary modern school students, on average, earn around 56% of that of the best performing group (former grammar or private school students). Post tax-and-transfer this figure has increased to 62%, while EOp tax rates would, on average, bring this post-fisc figure to 78% at an efficiency cost ε of on average 4%.

The educational qualifications and social status of one's parents certainly are beyond one's control. The worst-off group are those whose parents never went to school or left school with no qualifications (Table 4-4) and with respect to social status, those respondents whose parents are or were plant and machine operatives or have or had non-classifiable occupations according to the Standard Occupational Classification (SOC group levels 8 and 9) (Table 4-5).

Table 4-4: EOp policy using parental education as circumstance ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	$t_{\text{corr}}^{\text{EOp}}$	$c_{\text{corr}}^{\text{EOp}}$	v	ε	p	q	q^{EOp}
1991	0.52	3764	0.60	4471	0.99	0.97	0.72	0.76	0.84
1992	0.56	4552	0.61	5073	0.98	0.97	0.68	0.72	0.83
1993	0.62	5330	0.68	5819	0.96	0.96	0.71	0.76	0.88
1994	0.63	5473	0.70	6028	0.96	0.95	0.68	0.73	0.86
1995	0.63	5780	0.68	6297	0.96	0.96	0.70	0.75	0.87
1996	0.61	5642	0.67	6238	0.97	0.96	0.68	0.73	0.85
1997	0.59	5668	0.66	6404	0.98	0.96	0.71	0.75	0.86
1998	0.55	5460	0.64	6439	0.98	0.96	0.71	0.75	0.85
1999	0.56	5942	0.64	6888	0.98	0.96	0.72	0.77	0.86
2000	0.59	6846	0.68	8002	0.98	0.96	0.70	0.74	0.86
2001	0.63	7714	0.70	8620	0.96	0.95	0.69	0.74	0.87
2002	0.63	8215	0.69	9018	0.96	0.95	0.68	0.74	0.86
2003	0.62	8481	0.68	9382	0.97	0.96	0.69	0.75	0.87
2004	0.65	9284	0.70	9998	0.96	0.95	0.67	0.72	0.86
2005	0.59	8582	0.65	9618	0.98	0.96	0.68	0.73	0.84
2006	0.65	10181	0.71	11070	0.96	0.95	0.66	0.72	0.86
2007	0.64	10619	0.68	11239	0.96	0.96	0.67	0.72	0.85
2008	0.66	11201	0.70	11885	0.96	0.95	0.63	0.69	0.84

Table 4-5: EOp policy using parental socio-economic status as circumstance ($\eta = 0.06$)								
	t^{EOp}	c^{EOp}	$t^{\text{EOp}}_{\text{corr}}$	$c^{\text{EOp}}_{\text{corr}}$	v	ε	p	q	q^{EOp}
1991	0.59	4517	0.60	4585	0.97	0.97	0.64	0.69	0.81
1992	0.67	5700	0.67	5722	0.93	0.96	0.61	0.66	0.83
1993	0.65	5873	0.66	5909	0.94	0.96	0.63	0.68	0.83
1994	0.63	5813	0.64	5850	0.96	0.96	0.61	0.66	0.80
1995	0.67	6569	0.67	6575	0.94	0.96	0.57	0.63	0.80
1996	0.64	6395	0.64	6409	0.96	0.96	0.62	0.67	0.81
1997	0.56	5656	0.56	5691	0.98	0.97	0.64	0.69	0.79
1998	0.61	6415	0.62	6428	0.96	0.97	0.63	0.68	0.81
1999	0.64	6962	0.64	6946	0.95	0.96	0.61	0.66	0.81
2000	0.61	7287	0.61	7289	0.96	0.97	0.62	0.67	0.80
2001	0.60	7656	0.61	7687	0.97	0.97	0.66	0.71	0.82
2002	0.64	8711	0.64	8709	0.95	0.96	0.60	0.65	0.80
2003	0.62	8782	0.62	8803	0.96	0.97	0.58	0.64	0.78
2004	0.65	9495	0.65	9486	0.96	0.96	0.56	0.62	0.78
2005	0.67	9955	0.67	9968	0.95	0.96	0.58	0.64	0.80
2006	0.71	11258	0.71	11260	0.93	0.95	0.57	0.64	0.82
2007	0.70	11631	0.70	11612	0.93	0.95	0.57	0.64	0.82
2008	0.75	13011	0.75	13007	0.90	0.94	0.59	0.66	0.86

Both measures capturing parental background show similar findings with respect to EOp. In both cases v is below unity for all years, while polarization captured by p remains rather constant. The mean age of A and B groups are almost identical when using parental occupation as circumstance, while parental education as circumstance requires greater correction for age, as individuals with less educated parents on average are older.

We tested a number of additional circumstances for the United Kingdom, such as birth order. We find the worst-off group constitutes those born second or later, yet note this group represents over 75 percent of the sample. This fact causes the difference between the wage distributions of the worst-off group (A) and of society as a whole (B) to be small, driving t^{EOp} to zero. When the difference between the overall wage distributions and the worst-off group is very small, the EOp tax becomes zero, as the low inequality of opportunity can only be reduced by applying a positive tax, but incurring deadweight losses. One should be cautious interpreting such a zero tax rate as the realization of equal opportunities for all in these cases, but rather interpret this as achieving EOp given the scope for redistribution in the face of potential deadweight losses. In other words, given a wage elasticity of η, the deadweight loss may in certain cases be greater than the counteracting benefit of more EOp (Roemer et al. 2003: 548). We are hence more likely to find positive EOp tax rates when defining circumstances such that the worst-off group constitutes a small minority, as is the case for all the circumstances captured above (with the exception of gender). One way to arrive at such minorities is to take into account more than a single circumstance, by further refining types in the calculation of equality of

opportunity. It may in our case be females who attended secondary modern schools from a less advantaged family background.

Figure 4-4 collapses the EOp tax rates under each of the circumstances into one graph, pitched against the observed UK tax regime for every year under analysis. This serves as a ranking in terms of the importance of each of the defined circumstances in terms of their influence on income attainment. We see that gender is the circumstance which most influences individuals' attainment of gross income. Parents' education and socio-economic class (SEC) can be seen to acquire a relatively important and similar influence on income attainment, as does school type, and would require tax levels above those we observe for the UK.
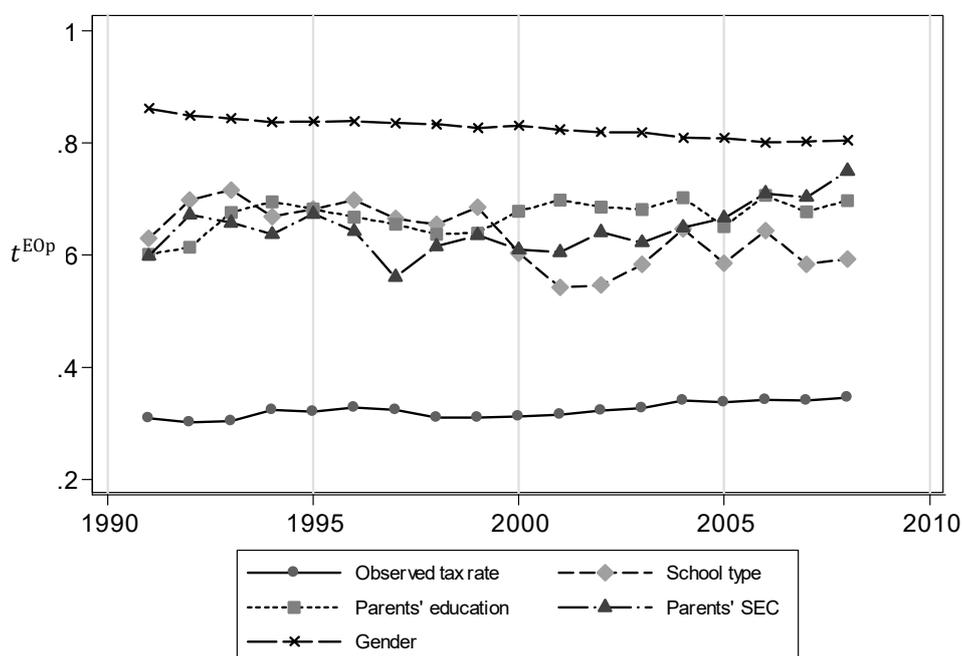
Figure 4-4: Equality of opportunity tax rate under labor supply elasticity of 0.06

Can membership of the worst-off type for a specific circumstance predict membership of type A for another? Using χ^2 tests, we find such associations in all cases but between gender and parental education. The strength of these association varies however, where the weakest associations are between gender and school type ($\chi^2=7.8$) and gender and parental SEC ($\chi^2=19$), while the strongest are between school type and parental education ($\chi^2=585$) and parental education and parental SEC ($\chi^2=1,400$).

This final association shows that both parental education and socio-economic class as defined by occupation—often used as family background measures in inequality and intergenerational social mobility studies, serve almost identical as predictors of income attainment. While the transmission mechanisms of advantages from parents to children arguably differs between both these circumstances (see Davis-Kean, 2005; Chevalier et al.

2013), where the cultural channel of transmission of advantages from parents to children may be captured by the educational level of the parents, while the financial channel may be better captured by the parents socio-economic class, we find both circumstances are strongly associated and hence require similar tax rates to equalize opportunities. Using just one of the measures in isolation may thus be sufficient to capture the need for redistribution based upon family circumstances.

Figure 4-5 presents the results under the assumption of a labor supply elasticity with respect to wage of 0.12, as opposed to 0.06. A higher value for η will mean a larger income loss due to taxation, and hence lead to a lower EOp tax rate (Roemer et al. 2003: 549). For the circumstance of gender, we find the observed fiscal policy in the UK is still unable to equalize opportunities, while the UK tax-and-transfer system seems to accommodate EOp relatively well with respect to all other typologies. Under the assumption of a higher wage elasticity the UK tax regime clearly fares much more favorably with respect to equality of opportunity.
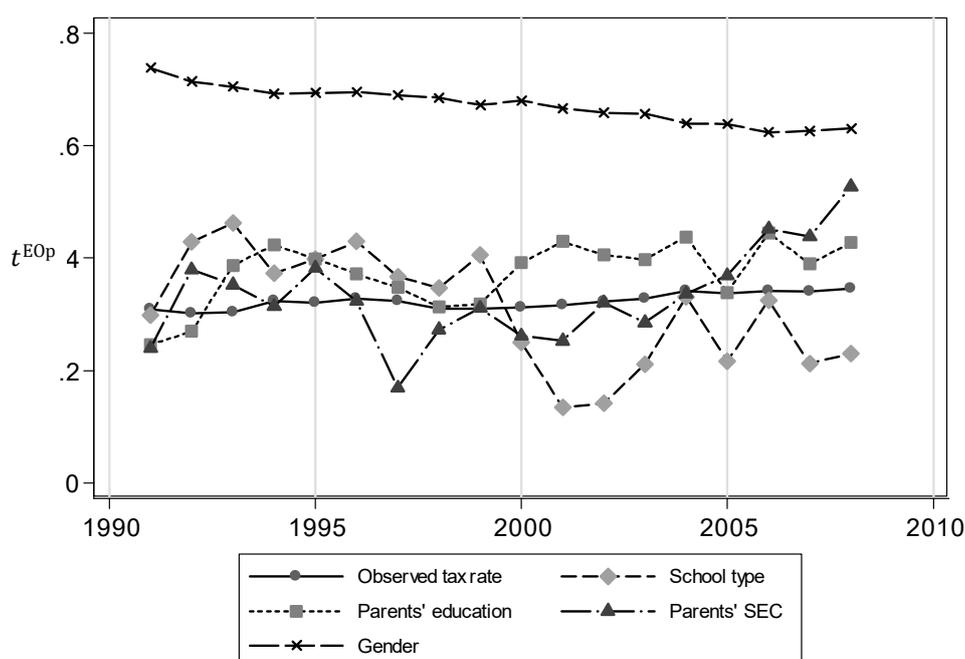
Figure 4-5: Equality of opportunity tax rate under labor supply elasticity of 0.12

How well does Roemer's model capture individual labor supply? EOp using observed wage rates

This section offers an extension of the main research questions to investigate the extent to which the applied framework captures individual labor supply to calculate the optimal equal opportunity policy. As formalized in the theoretical section, Roemer's methodological framework derives individual labor supply from observed pre-fisc income. The BHPS also

contains information on the reported amount of hours individuals work, which can be used along with observed pre-fisc income to calculate the observed wage rate, by way of (22):

$$w_i^{\text{obs}} = \frac{x_i^{\text{obs}}}{L_i^{\text{obs}}}, \quad \text{where } w_i^{\text{obs}} = 0 \text{ if } L_i^{\text{obs}} = 0 \tag{22}$$

By incorporating the observed wage rate in Roemer's framework, as opposed to the simulated wage distribution, the intention is to see how well the framework actually captures individual labor supply. In order to use the observed individual labor supply (L_i^{obs}) in Roemer's framework, it has to be made compatible with Roemer's simulated individual labor supply (L_i^*), following from the maximization of the utility function subject to the budget constraint:

$$L_i^{\text{obs}} = L_i^* = \left[\frac{(1-t)w_i}{\hat{\alpha}} \right]^{\eta} \tag{23}$$

In order to solve this in a computationally convenient way we allow for an individual-specific disutility of the labor, by way of the parameter α_i, as follows:

$$L_i^{\text{obs}} = L_i^* = \left[\frac{(1-t)w_i}{\alpha_i\left(1+\frac{1}{\eta}\right)} \right]^{\eta} = \left[\frac{(1-t)w_i}{\hat{\alpha}_i} \right]^{\eta}, \quad \text{where } L_i^* = 0 \text{ if } \hat{\alpha}_i = 0 \tag{24}$$

Rearranging (24) gives the following expression for $\hat{\alpha}_i$, which is incorporated in the analyzes below:

$$\hat{\alpha}_i = \frac{(1-t^{\text{obs}})w_i^{\text{obs}}}{(L_i^{\text{obs}})^{1/\eta}}, \quad \text{where } \hat{\alpha}_i = 0 \text{ if } L_i^{\text{obs}} = 0 \tag{25}$$

We drop individuals with an exceptionally high hourly wage[36], individuals that report positive work hours yet report zero labor income and also drop individuals that report zero work hours yet positive labor incomes. Finally, individuals that did not report work hours, yet report zero labor income are assumed to work zero hours. We find the correlation between Roemer's derived labor supply, L^*, and the observed labor supply, L_i^{obs}, is 0.78 and the correlation between the simulated wage rate, w^*, and the observed wage rate, w^{obs}, is 0.87. The high correlation for labor supply is however largely driven by the fact both methods are able to describe individuals with zero incomes and zero labor supplies. When only taking into account individuals with positive labor supplies, the correlation coefficients drop to 0.45 for labor supply (remaining rather stable at 0.83 for the wage rate).

---

[36] Six individuals exhibit hourly wage rates of over 140 GBP. These high rates stem from individuals reporting work weeks of 2 to 8 hours coupled with high gross labor incomes (between 16,000 and 80,000 GBP).

The next step is to calculate the EOp policy where, taking type 1 as the most disadvantaged group of individuals, we have the average post-fisc income of type 1 at policy (t, c):

$$\bar{y}_1 = (1 - t)\left[\frac{(1 - t)}{\hat{\alpha}_i}\right]^\eta A' + t\left[\frac{(1 - t)}{\hat{\alpha}_i}\right]^\eta B' - g \tag{26}$$

with $A' = \int \frac{w^{1+\eta}}{\hat{\alpha}_i^\eta} F^1(w) dw$ and $B' = \int \frac{w^{1+\eta}}{\hat{\alpha}_i^\eta} F(w) dw$.

The EOp fiscal policy is then again calculated as the maximin of the value of post-fisc income, that is, by maximizing (26) with respect to t:

$$t^{\text{EOp}} = \max\left[1 - \frac{\eta B'}{(1 + \eta)(B' - A')}, 0\right] \tag{27}$$

Figure 4-6 presents the results for the EOp tax rate, using the observed individual labor supply and calculated wage rate. We find similar optimal tax rates with respect to EOp for all variables, implying the derived effort distribution from above does not clearly bias estimations of t^{EOp}.
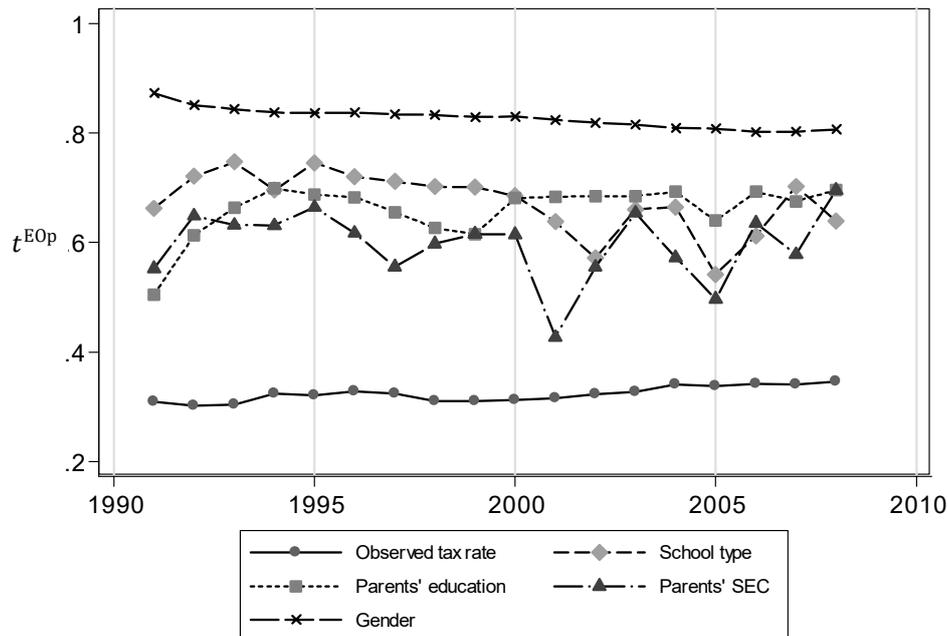
Figure 4-6: Observed and EOp tax rates using observed wage rates

Netherlands

In order to compare the results to other countries, the LISS (2016) panel is used to run the same analysis for the Netherlands. Circumstances are defined as gender, highest educational qualification between both parents, father's occupation, origin (either autochthonous, or first or second-generation foreign with either a Western of non-western background).

Table 4-6–Table 4-9 below present the calculations under the assumption of $\eta = 0.06$. Table 4-6 includes the calculations of t^{obs} and c^{obs} and t^{bench}. Under the observed Dutch fiscal policy, the effective tax rate is around 42 percent, noting the Netherlands spends over thirty percent of its national income on government goods and services. This implies around ten percent of income taxation is used for redistributive purposes. Findings for gender are similar to those in the UK: EOp tax rates should be between 0.8 and 0.74. Women earn around two thirds that of men (0.66 in 2015, see p), while t^{EOp} would lower this to a fraction of 0.83, see q and q^{EOp}.

Table 4-6: EOp policy using gender as circumstance for the Netherlands ($\eta = 0.06$)

	t^{obs}	c^{obs}	t^{bench}	t^{EOp}	c^{EOp}	v	ε	p	q	q^{EOp}
2009	0.43	224	0.33	0.80	954	0.90	0.94	0.55	0.60	0.82
2010	0.42	224	0.33	0.80	964	0.90	0.94	0.56	0.61	0.83
2011	0.42	227	0.32	0.79	957	0.90	0.94	0.56	0.61	0.83
2012	0.42	224	0.32	0.78	951	0.91	0.94	0.57	0.62	0.83
2013	0.42	238	0.32	0.78	956	0.92	0.94	0.58	0.63	0.83
2014	0.42	235	0.32	0.76	938	0.93	0.95	0.60	0.65	0.83
2015	0.42	231	0.32	0.75	926	0.93	0.95	0.62	0.66	0.83
2016	0.41	231	0.31	0.74	929	0.94	0.95	0.63	0.67	0.83

Regarding parental education, the least well off group constitutes those for whom the highest level of education among both parents is either elementary school or junior vocational education, as well as parents who have not completed elementary school. Those most well off either have parents who went to university, or post-academic degree (e.g. notary, medical, Ph.D.). EOp tax rates average 0.66 and are downwardly biased due to differences in respondents' age, as shown by $t^{\text{EOp}}_{\text{corr}}$. The income of the worst off group, on average, is around 67% of that of the best off group (p). Post tax-and-transfer this figure has increased to 71%, while EOp tax rates would, on average, bring this post-fisc figure to 79% (q^{EOp}) at an efficiency cost ε of on average 3%.

Table 4-7: EOp policy using parental education as circumstance for the Netherlands ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	$t^{\text{EOp}}_{\text{corr}}$	$c^{\text{EOp}}_{\text{corr}}$	v	ε	p	q	q^{EOp}
2009	0.51	378	0.60	554	1.00	0.98	0.70	0.74	0.78
2010	0.56	497	0.63	630	1.00	0.97	0.70	0.74	0.80
2011	0.61	611	0.67	717	0.99	0.97	0.64	0.68	0.77
2012	0.60	608	0.67	748	0.99	0.97	0.68	0.72	0.81
2013	0.65	713	0.69	791	0.98	0.96	0.66	0.70	0.81
2014	0.65	727	0.68	792	0.98	0.97	0.63	0.67	0.78
2015	0.61	664	0.66	779	0.99	0.97	0.67	0.71	0.80
2016	0.60	673	0.63	738	0.99	0.97	0.62	0.66	0.76

Regarding one's origin, the least well off group constitutes of first-generation foreigners with a non-Western background. Those belonging to the most well off group either are from a second-generation foreign background (surprisingly both Western or non-western, although

their numbers in the survey are small, between 31 and 200 observations per month, and hence potentially distortive), or from a Dutch autochthonous background. EOp tax rates (both corrected and uncorrected) average 0.77. The income of the worst off group, on average, is around 73% of that of the best off group (p). Post tax-and-transfer this figure has increased to 77%, while EOp tax rates would, on average, bring this post-fisc figure to 90% at an efficiency cost ε of on average 5%.

Table 4-8: EOp policy using origin as circumstance for the Netherlands ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	$t_{\text{corr}}^{\text{EOp}}$	$c_{\text{corr}}^{\text{EOp}}$	v	ε	p	q	q^{EOp}
2009	0.80	870	0.80	865	0.90	0.94	0.65	0.70	0.88
2010	0.77	850	0.76	844	0.93	0.95	0.74	0.78	0.90
2011	0.77	887	0.77	883	0.92	0.95	0.73	0.77	0.90
2012	0.75	872	0.76	882	0.93	0.95	0.75	0.79	0.90
2013	0.72	847	0.74	874	0.95	0.95	0.78	0.81	0.91
2014	0.76	927	0.77	937	0.93	0.95	0.74	0.78	0.90
2015	0.79	991	0.80	1007	0.90	0.94	0.70	0.74	0.90
2016	0.79	1009	0.81	1033	0.90	0.94	0.71	0.75	0.91

For the occupation of one's father, the least well off group constitutes of alternatingly parents with an agrarian occupation or in semi-skilled manual labor. Those belonging to the most well off group have fathers who worked in a higher intellectual or independent profession (e.g. architect, physician, scientific researcher, academic lecturer, engineer). EOp tax rates average 0.46, only very slightly downwardly biased by age, as can be seen from $t_{\text{corr}}^{\text{EOp}}$. The income of the worst off group, on average, is around 73% of that of the best off group (p). Post tax-and-transfer this figure has increased to 76%, while EOp tax rates would, on average, bring this post-fisc figure to 78%. These last two figures are very close as observed tax rates are nearly equal to those warranted under EOp, which can also be seen from v equaling one.

Table 4-9: EOp policy using occupation of father as circumstance for the Netherlands ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	$t_{\text{corr}}^{\text{EOp}}$	$c_{\text{corr}}^{\text{EOp}}$	v	ε	p	q	q^{EOp}
2009	0.41	156	0.42	175	1.00	1.00	0.75	0.78	0.77
2010	0.49	346	0.50	362	1.00	0.99	0.73	0.76	0.78
2011	0.47	328	0.47	333	1.00	0.99	0.72	0.75	0.77
2012	0.47	331	0.48	359	1.00	0.99	0.74	0.77	0.79
2013	0.46	337	0.47	361	1.00	0.99	0.73	0.76	0.78
2014	0.50	445	0.51	465	1.00	0.99	0.71	0.74	0.77
2015	0.50	469	0.51	479	1.00	0.99	0.70	0.74	0.77
2016	0.33	90	0.33	76	1.00	1.01	0.72	0.75	0.73

Figure 4-7 again merges the EOp tax rates under each of the circumstances into one graph, pitched against the observed Dutch tax regime for every month under analysis. Also in the Netherlands gender appears to be the circumstance which most influences individuals' attainment of gross income. One's origin however requires a similar and in later waves even a higher tax rate to equalize opportunities. Parental education is found to be far more important than parental occupation, and would require tax levels well above those which we observe. Interestingly, the tax system seems relatively well adapted at correcting for the effects one's

parent's occupation has on income attainment. Figure 4-8 presents the results under the assumption of a higher labor supply elasticity with respect to wage (0.12). Here, for the circumstance of gender and origin we find the observed fiscal policy in the Netherlands is still unable to equalize opportunities. The tax-and-transfer system now however seems to accommodate EOp relatively well with respect to parental education, yet is overtaxing given differences due to the occupation of one's father.
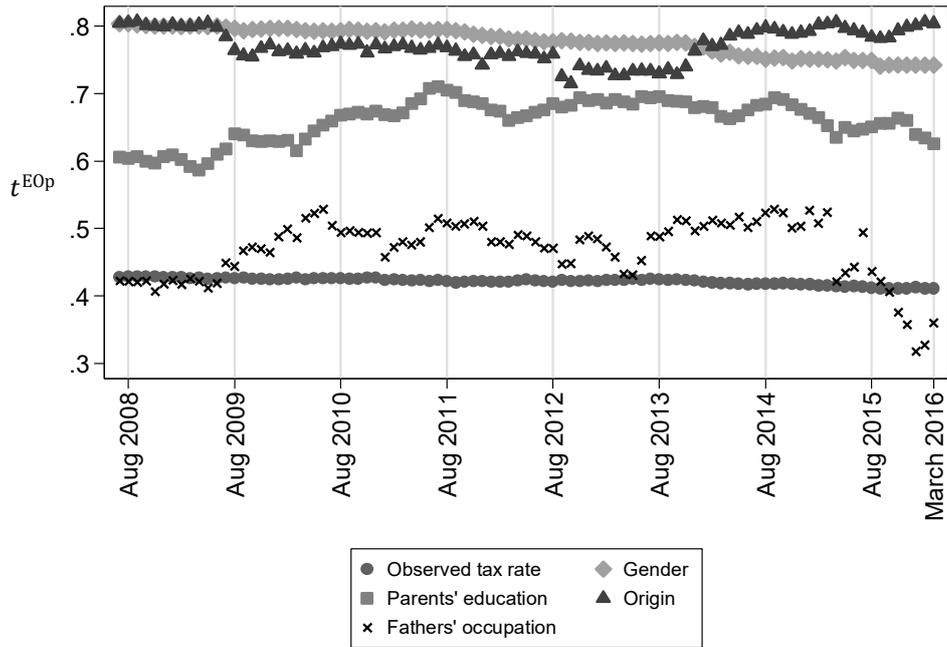

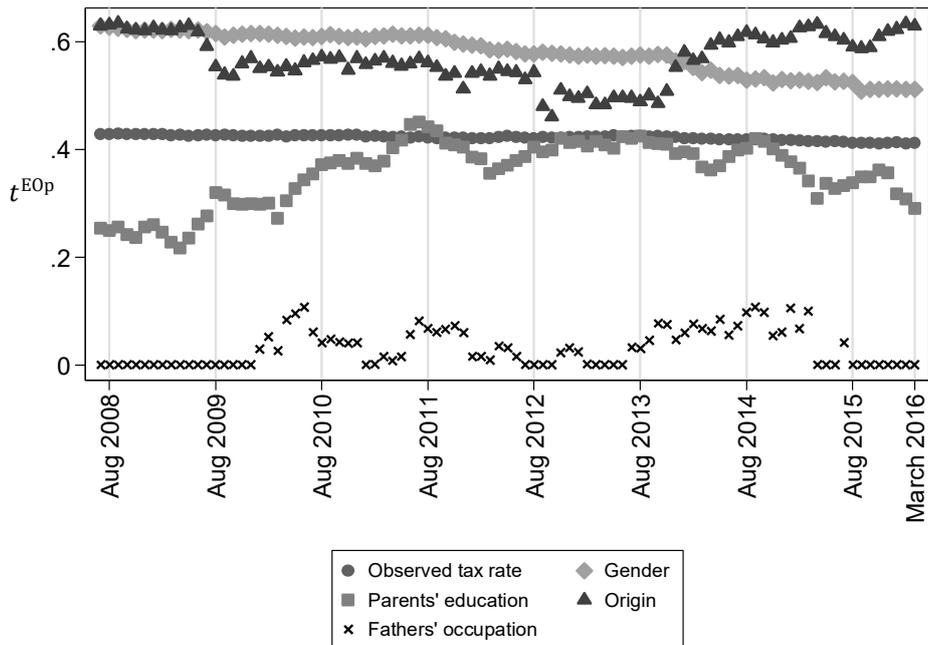Figure 4-7: EOp tax rates under a labor supply elasticity of 0.06

Figure 4-8: EOp tax rates under a labor supply elasticity of 0.12

Germany

In assessing EOp for Germany, throughout all analyses, sample status within the panel (belonging either to the original East or West German sample) appears very important. Circumstances beyond sample status, including parental occupation and education are therefore included as a second type on top of East or West German sample status. Effects of differential parental education on income attainment are thus those given one's roots in either the former DDR or BRD. When assessing the sole effects of differential parental education, very mixed results are found, as individuals with similar parental backgrounds perform very differently based on their sample status.

Under the observed German fiscal policy, the effective tax rate is between 43 and 51 percent, as shown by t^{bench}, noting that Germany spends between 20 to 26 percent of its national income on government goods and services. This implies around 20 percent of income taxation is used for redistributive purposes. When firstly when using sample status as circumstance, EOp is high but appears to decrease between 1990 and 2010, requiring a tax rate ranging from 83% to 56%, where members of the East German sample belong to worst off group. This difference is largely driven by an increase in the pre-fisc EOp, as shown by p. In 1990, average pre-fisc income of members of the East German sample was a fraction 0.55 that of those in the West German sample, while this fraction grew to 0.79 in 2010. EOp would require this ratio to be 0.87 in the final observed year, implying further corrective measures are necessary, at a cost of around 1 percent of total income (when operating at a labor supply elasticity of 0.06).

Table 4-10: EOp policy using East or West German sample status as circumstance for Germany ($\eta = 0.06$)

	t^{obs}	c^{obs}	t^{bench}	t^{EOp}	c^{EOp}	$t_{\text{corr}}^{\text{EOp}}$	$c_{\text{corr}}^{\text{EOp}}$	v	ε	p	q	q^{EOp}
1990	0.43	3985	0.23	0.83	10833	0.83	10854	0.86	0.93	0.55	0.65	0.88
1991	0.44	4697	0.23	0.81	11561	0.81	11623	0.90	0.94	0.59	0.69	0.88
1992	0.45	5112	0.23	0.77	11523	0.78	11608	0.93	0.95	0.66	0.75	0.88
1993	0.46	5025	0.24	0.73	10710	0.74	10830	0.96	0.96	0.70	0.78	0.88
1994	0.49	5431	0.26	0.71	10284	0.71	10412	0.98	0.97	0.72	0.80	0.88
1995	0.51	6243	0.26	0.70	10481	0.71	10632	0.98	0.97	0.73	0.82	0.88
1996	0.51	6366	0.26	0.70	10628	0.71	10754	0.98	0.97	0.73	0.82	0.88
1997	0.51	6332	0.26	0.71	11069	0.71	11156	0.98	0.97	0.72	0.81	0.88
1998	0.51	6770	0.26	0.71	11581	0.71	11664	0.98	0.97	0.72	0.81	0.88
1999	0.51	7064	0.25	0.70	11803	0.70	11829	0.98	0.97	0.73	0.81	0.88
2000	0.49	6801	0.25	0.71	12501	0.71	12492	0.98	0.97	0.72	0.80	0.88
2001	0.49	7271	0.25	0.70	12702	0.70	12675	0.98	0.97	0.73	0.81	0.88
2002	0.51	7527	0.25	0.69	12325	0.68	12241	0.99	0.97	0.73	0.82	0.88
2003	0.48	7206	0.24	0.70	12954	0.69	12815	0.98	0.97	0.72	0.81	0.88
2004	0.46	6580	0.23	0.70	12849	0.69	12661	0.97	0.97	0.73	0.80	0.88
2005	0.46	6516	0.24	0.69	12631	0.67	12263	0.98	0.97	0.74	0.81	0.88
2006	0.47	6784	0.24	0.66	12253	0.65	11846	0.98	0.98	0.75	0.82	0.88
2007	0.45	6484	0.25	0.68	13178	0.67	12814	0.98	0.97	0.74	0.80	0.88
2008	0.45	6880	0.24	0.60	11314	0.58	10591	0.99	0.98	0.79	0.84	0.88
2009	0.45	6756	0.25	0.64	12769	0.63	12333	0.99	0.98	0.77	0.82	0.88
2010	0.45	6746	0.26	0.59	11132	0.56	10236	0.99	0.99	0.79	0.84	0.87

Further circumstances given sample status are defined as parental occupation and parental education, both defined as the highest level among both parents, if available. As becomes clear from the graph, given sample status, parental background requires even higher taxes to achieve EOp for Germany. The worst off with respect to parental education are those from the East German sample with parents who performed skilled or unskilled manual labor. Concerning parental education, the worst off group are those individuals from the East German sample whose parents have a secondary school degree. Here, the gross differences in income between worst off and best off have also decreased strongly over time, yet are and persist to be far greater than those found above. The decrease in the t^{EOp} thus is also less pronounced compared to Table 4-10.
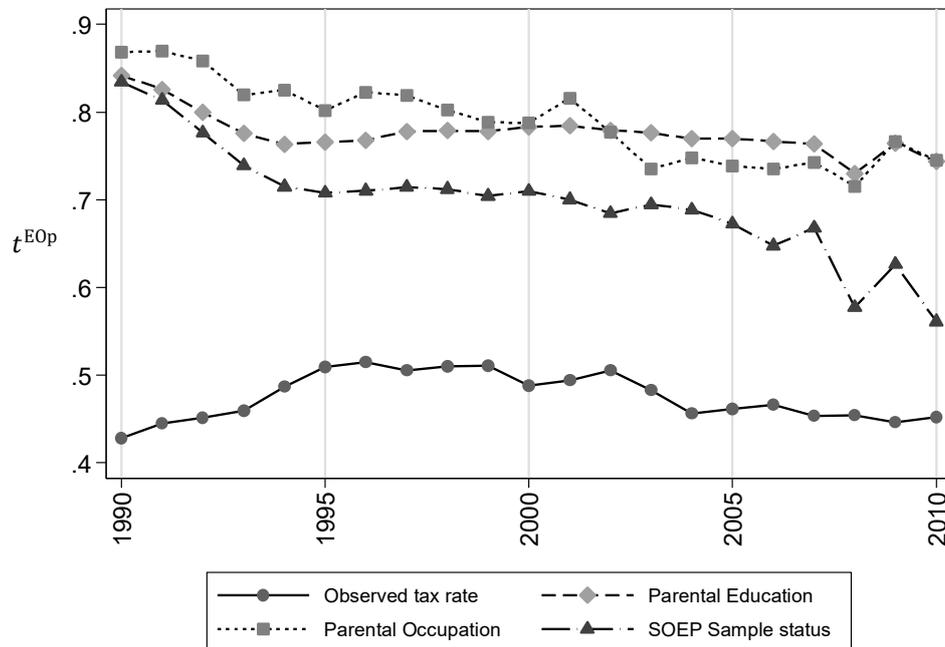

Figure 4-9: EOp tax rates under a labor supply elasticity of 0.06

Table 4-11: EOp policy using parental education as circumstance for Germany ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	t^{EOp}_{corr}	c^{EOp}_{corr}	v	ε	p	q	q^{EOp}
1990	0.84	11123	0.84	11166	0.85	0.93	0.41	0.51	0.81
1991	0.82	11855	0.83	11945	0.89	0.93	0.46	0.57	0.83
1992	0.79	12025	0.80	12162	0.92	0.94	0.52	0.63	0.83
1993	0.76	11465	0.78	11662	0.94	0.95	0.51	0.62	0.80
1994	0.75	11184	0.76	11508	0.96	0.95	0.59	0.69	0.83
1995	0.75	11575	0.77	11947	0.97	0.96	0.57	0.69	0.82
1996	0.75	11757	0.77	12102	0.97	0.96	0.58	0.70	0.83
1997	0.76	12294	0.78	12611	0.96	0.95	0.45	0.57	0.75
1998	0.76	12965	0.78	13265	0.96	0.95	0.47	0.59	0.77
1999	0.76	13333	0.78	13674	0.96	0.95	0.53	0.65	0.81
2000	0.77	14113	0.78	14425	0.95	0.95	0.51	0.63	0.81
2001	0.76	14366	0.78	14854	0.96	0.95	0.56	0.68	0.84
2002	0.76	14209	0.78	14719	0.96	0.95	0.59	0.70	0.84
2003	0.75	14416	0.78	14982	0.96	0.95	0.59	0.70	0.84
2004	0.74	14195	0.77	14769	0.95	0.95	0.58	0.68	0.84
2005	0.73	13960	0.77	14810	0.96	0.95	0.58	0.68	0.83
2006	0.73	14172	0.77	14985	0.96	0.95	0.60	0.70	0.84
2007	0.72	14403	0.76	15568	0.97	0.95	0.57	0.65	0.81
2008	0.68	13580	0.73	14946	0.98	0.96	0.54	0.64	0.78
2009	0.72	15254	0.76	16374	0.96	0.95	0.61	0.70	0.84
2010	0.72	14937	0.74	15702	0.97	0.96	0.62	0.70	0.84

Table 4-12: EOp policy using parental occupation as circumstance for Germany ($\eta = 0.06$)

	t^{EOp}	c^{EOp}	t^{EOp}_{corr}	c^{EOp}_{corr}	v	ε	p	q	q^{EOp}
1990	0.83	12730	0.87	13209	0.86	0.92	0.49	0.58	0.88
1991	0.81	13096	0.87	13948	0.90	0.92	0.52	0.62	0.88
1992	0.85	14362	0.86	14434	0.84	0.92	0.48	0.59	0.87
1993	0.80	13049	0.82	13431	0.92	0.94	0.54	0.64	0.86
1994	0.82	13349	0.83	13505	0.91	0.94	0.55	0.66	0.87
1995	0.80	13233	0.80	13213	0.94	0.95	0.54	0.66	0.84
1996	0.81	13207	0.82	13445	0.93	0.94	0.44	0.57	0.80
1997	0.81	13451	0.82	13667	0.93	0.94	0.35	0.48	0.73
1998	0.80	14040	0.80	14101	0.94	0.95	0.46	0.59	0.80
1999	0.80	14271	0.79	13992	0.94	0.95	0.42	0.56	0.76
2000	0.81	14960	0.79	14587	0.93	0.95	0.46	0.58	0.79
2001	0.82	15315	0.82	15266	0.92	0.94	0.53	0.66	0.85
2002	0.77	14496	0.78	14608	0.95	0.95	0.53	0.65	0.81
2003	0.78	14737	0.74	13793	0.95	0.96	0.47	0.60	0.76
2004	0.78	14731	0.75	13957	0.93	0.95	0.47	0.58	0.77
2005	0.74	13643	0.74	13524	0.96	0.96	0.58	0.68	0.82
2006	0.74	13842	0.74	13833	0.96	0.96	0.50	0.61	0.76
2007	0.75	14391	0.74	14316	0.95	0.96	0.55	0.64	0.80
2008	0.74	14718	0.72	14078	0.95	0.96	0.48	0.58	0.74
2009	0.77	15546	0.77	15543	0.94	0.95	0.52	0.62	0.80
2010	0.75	15250	0.75	15043	0.95	0.96	0.60	0.69	0.83

Figure 4-10 again presents results under the assumption of a higher labor supply elasticity with respect to wages. Under such higher elasticities, one finds the observed fiscal policy over time is able to equalize opportunities between East and West samples, even overtaxing in later years. Given one's sample status, however, differences due to parental background still require higher tax rates in order to equalize opportunities.
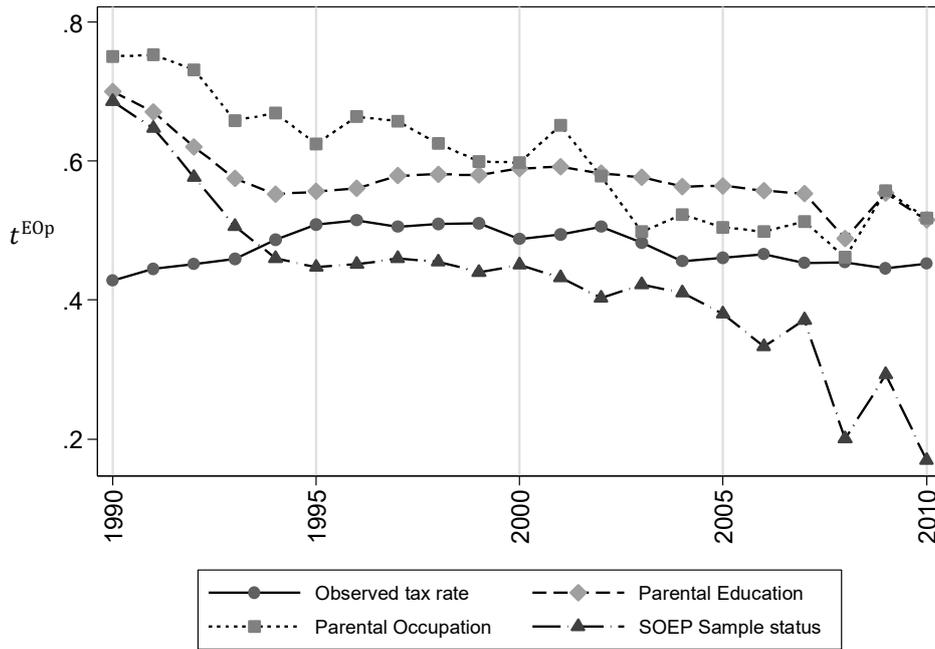
Figure 4-10: EOp tax rates under a labor supply elasticity of 0.12

5. Conclusion

Granted that Equality of Opportunity is argued to be more relevant today than Equality of Outcomes, there are still concerns related to its empirical operationalization and the results must therefore be used with caution when informing policy discourse (Kanbur and Wagstaff, 2015). One of the main challenges of the Equality of Opportunity approach consists in the practical partitioning of inequalities for which individuals are accountable and those for which they are not in order to differentiate the unacceptable inequalities, for which compensation is due, from those which are considered as acceptable. Measuring and including all individual circumstances in this partitioning is unlikely to be feasible, which may lead to biases in estimations of Equality of Opportunity tax rates, misleading its practical use in the policy context (Kanbur and Wagstaff, 2015). That said, identifying those circumstances which most limit individuals in the attainment of income in a given society and identifying the part of inequality related to these observable circumstances is of great value to policymakers in continuously improving the design and implementation of practical redistributive public intervention to combat these inequalities.

Although Roemer regards opportunities as the appropriate equalizandum, he does not explore the precise grounds on which compensation should be sought–merely endorsing a distinction between effort and circumstances, where on the basis of the latter compensation is

sought (Risse, 2002). The extent to which opportunities are to be equalized, its particular conception of what equalizing opportunities requires and those disadvantageous circumstances for which compensation is due is to be determined by the society at hand. We investigate the extent to which the observed tax-and-transfer regimes of the United Kingdom, the Netherlands and Germany equalize opportunities for income for gender, (parental) background and education. Comparing firstly the observed tax rates, those in Germany are found to be highest (between 45 and 51 percent), with around 20 percent directed towards income transfers, followed by the Netherlands (around 42 percent), with around 12 percent directed towards income transfers. For the United Kingdom we find tax rates which are the lowest (between 30 and 35 percent), yet directing around 10 percent towards income transfers.

If fiscal policy is to be successful in correcting inequality of economic opportunity in the United Kingdom, policymakers must go further in including gender as well as socio-economic characteristics of individuals. We find observed tax rates are around half those necessary to correct for parental background variables, and around one third those necessary to correct for gender differences in income attainment. Findings are similar for the Netherlands, where gender also appears to be the circumstance which most influences individuals' attainment of gross income. One's origin (being an immigrant or non-immigrant) requires similar and in later waves even a higher tax rate to equalize opportunities. Compared to the United Kingdom, where there is no clear difference between parental education and parental occupation, in the Netherlands parental education is found to be far more important than parental occupation, and would require tax levels well above those which we observe. The tax system in the Netherlands seems relatively well adapted in correcting for the effects parental occupation has on income attainment.

Findings for Germany are largely dependent on the background of respondents, given one's roots in either the former DDR or BRD. Given such roots, parental background requires even higher taxes to achieve EOp for Germany. Decreases in the required tax rates to reach Equality of Opportunity for Germany are largely driven by an improvement in pre-fisc wages of those belong to the least advantaged types in East Germany. As tax rates have remained constant within Germany over the time span, this has brought EOp further within reach.

We show findings largely depend on both the labor supply elasticity with respect to wages and on the definition of relevant circumstances. Higher wage elasticities imply less capacity for governments to reach equality of opportunity through the tax-and-transfer systems. We show for certain circumstances one should correct covariates such as age, which may both determine labor income and shape one's background characteristics. Finally, we demonstrate

estimated labor supplies from Roemer's (2003) model align with data containing observed working hours, and generate similar Equality of Opportunity tax rates. Future studies may use harmonized data sets (e.g. LIS) to study EOp under a harmonized income definition, aiding comparability.

Chapter 5: **Does Job Insecurity affect Party Support and Voting? Testing the Compensation Hypothesis**[37]

Abstract: Literature has proposed two competing accounts of the effects of globalization on the welfare state. The compensation hypothesis argues welfare states are robust or may even expand in the face of globalization as governments seek to compensate an increasing group of potential losers from globalization. The constraint hypothesis argues globalization reduces states' room for maneuver, causing downward pressure on government revenues and hence leading to a retrenchment of the welfare state. We test the aggregate effects of these theories at the micro-level, seeking to find whether and how job risks associated with increased international competition affect party support and voting in the United Kingdom—a country especially affected by economic globalization—between 1992 to 2008. We find evidence for the compensation hypothesis, however noting the effect to be strongly moderated by occupational unemployment. Job insecurity alone cannot explain party support; only in times of high (occupational) unemployment do increases in job insecurity translate into higher propensities of left wing party support. We show these effects of party support to affect actual voting outcomes, moving Conservative voters to the Labour party. We are the first contribution testing the linkages between job insecurity and mainstream party support using within-individual dynamics over time in a fixed-effects analysis, implicitly controlling for a range of (unobserved) time-invariant individual background characteristics. While findings are robust to different specifications, they appear to be country-specific, as the final section elaborates findings using different data for Germany finding no effects on mainstream party support.

1. Introduction

Has globalization jeopardized the welfare state? Recent literature has reached contradictory answers regarding this question (Walter 2010). Proponents of the *constraint hypothesis* suggest trade liberalization and factor mobility causes downward pressure on taxes and hence leads to retrenchment of welfare states. The *compensation hypothesis*, on the other hand, argues globalization will lead to expansion of welfare states, as governments seek to compensate an increasing group of (potential) losers from globalization for risks associated with increased international competition. A number of studies have tested these claims at the macro level (see e.g. Meinhard and Potrafke 2012), finding evidence of compensation. This paper aims to uncover micro-level mechanisms which may underlie their findings.

At the individual level, compensatory dynamics suggests workers experiencing job insecurity are more likely to pressure governments to increase or maintain social protection schemes. As globalization and the integration of global markets is thought to present a shock to the security of jobs in specific sectors, globalization is theorized to be among the main drivers of such compensatory demands. Globalization may however also present a constraining force on national governments, with Hellwig (2013: 3) asserting that at the micro level 'mass opinion about globalization's consequences may be filtered not by changing perceptions of market-induced risk (…), but by changing beliefs about the policy-maker capacity'. Globalization thus

---

may simultaneously affect sectoral job security and the scope for compensatory measures by governments.

This study investigates whether perceived economic (job) insecurity can explain retrenchment, resilience or expansion of welfare states through the channel of party support and voting. To answer this question, we employ panel data from 1991 to 2008 on employed working age individuals of voting age in the United Kingdom—a country especially affected by economic globalization (see e.g. Dreher 2006), extracted from the British Household Panel Survey (BHPS 2009). Our study is novel, as it is the first to exploit panel data to estimate the effects of changing perceptions of job security on support for specific political parties within individuals, able to control for a range of (unobserved) time invariant individual characteristics. We furthermore add to the literature by exploiting changes in occupational unemployment rates over time, signaling the moderating importance of occupational unemployment when linking job insecurity and voting behavior. We compare findings for the United Kingdom to an analysis of Germany, using comparable data from SOEP (2014).

The following section introduces the literature on globalization, job insecurity and party or policy preferences, and gives a number of empirical findings related to the compensation and constraint hypotheses. We test these linkages at the micro level, presenting the method and findings in sections 3 and 4. The final section concludes after a discussion of our findings.

2. Literature

The compensation hypothesis links theoretical work on the effects of globalization on the labor market and theories on the relationship between income and social policy preferences. While the latter linkage is well established in the political-economic literature (e.g. Meltzer and Richard 1981; Moene and Wallerstein 2001; Iversen and Soskice 2001) and applied empirically (see e.g. Groot and Van der Linde 2016), the former link between globalization and job insecurity has been proven to be more difficult to establish. Globalization is a diffuse process, where the term in some respects has served as a 'catch-all-phrase' describing the joint processes of increased trade openness, unrestricted capital flows and the spread of neoliberalism (Litonjua 2008). Easterly (2007: 111) defines globalization as the free or unrestricted movement of capital, labor, and goods across borders, suggesting the counterfactual in mind is 'a situation with restricted flows or, in the extreme case, no flows at all'.

Empirical studies seeking to capture the effects of globalization on job security generally build on theory suggesting workers are diffusely affected by globalization. Text book trade theory suggests that as developed nations have relatively abundant supplies of capital and

skilled labor, opening up to foreign markets will increase the exports of goods and services intensive in these abundant factors. While this increases demand for skilled labor, simultaneously, imports of goods and services relatively intensive in unskilled labor increase, decreasing demand for unskilled labor (see e.g. Feenstra and Hanson 1999). Unskilled labor is thus thought to be the 'loser' from the globalization process in developed nations, while high skilled labor stands to gain. Recent insights have found technological change and globalization may generate patterns different from this presupposed clear cut relationship. Goos et al. (2014) locate the losers from globalization not in the bottom of the income distribution, but around the middle income group, showing evidence of job polarization. Their findings indicate that together with routine-biased technological change, task offshoring led to a drop in the demand for middling occupations, relative to high-skilled *and* low-skilled.

Linking the effects of globalization to job security empirically, Scheve and Slaughter (2004) proxy globalization by FDI inflows into respective industries and find a positive relationship: FDI inflows negatively affect perceptions of job security. Walter (2010) uses industry-specific trade exposure and occupational-specific job offshoreability next to FDI inflows, and finds evidence linking globalization and job insecurity. She however notes a strong moderating effect of respondents' skill level: The job security of high skilled individuals remains constant or even increases with globalization, whereas among the low skilled the importance of job security in the labor market increases with globalization, echoing the above text book predictions.

As the onset of globalization has been shown to diffusely affect voters' job security, are there electoral consequences to be expected? Walter (2010, 408-409) claims 'empirically, it is still unclear whether globalization losers really exhibit a systematically higher probability of voting for parties of the left'. The key causal claim of the compensation hypothesis is that following globalization, a larger group of insecure voters push for more social protection. For it to hold, given globalization's impact on the labor market, a sufficiently large group of individuals must 'update beliefs about their susceptibility to market dislocations, and adjust the level of pressure placed on governments to deliver policies to compensate against risk' (Hellwig 2013: 3). Marx (2014) employs cross sectional data on self-assessed risk from the European Social Survey (ESS) and investigates the impact on job insecurity on preferences for redistribution. He finds subjective job insecurity does seem to increase demand for redistribution, however showing this effect is conditional on future employment prospects. Similarly, Rehm (2009), in a cross-country study, reveals occupational risk exposure are a strong predictor for individual demand for redistribution, performing better in explaining this

demand than industry-level exposure. Burgoon and Dekker (2010) use Eurobarometer data from 15 countries and find support for unemployment assistance to grow with job insecurity.

A weakness, however, in these studies assessing the compensatory logic following globalization at the micro level is their use of elicited demand for redistribution or social policy preferences from surveys as a dependent variable. For the compensation logic to actually affect policy, these findings hinge on a strong *ceteris paribus* assumption regarding all other effects of globalization at the ballot box. As Rodrik (1995) and others have suggested, the effects of globalization on the welfare state do not solely run through compensatory demands on behalf of the population, as globalization simultaneously affects governments' *scope for* compensatory measures—or at least beliefs thereof (Hellwig 2013). Next to affecting the desirability of welfare programs, even among the poor, by growing efficiency costs of taxation (Larcinese 2007), this constraining effect of globalization has been suggested to decrease voter turnout (Marshall and Fisher 2014), move electoral demands from constrained to non-constrained policy fields (Hellwig 2014), and increase the popularity and voting share of right-wing populist parties or third party alternatives in two-party systems (Mughan et al. 2003; Mughan and Lacy 2002; Geishecker and Siedler 2011). Ignoring the (perceived) 'supply side effects' of globalization (Cusack et al. 2006) may hence overestimate the compensatory effect of globalization, as at the voting booth the two hypotheses may cancel each other out.

We propose an estimation technique which gouges the aggregate effects of both compensating and constraining mechanisms by focusing on party support and actual voting behavior, instead of eliciting preferences on a single policy issue. To our knowledge, only a small number of studies have previously done so. These include cross-sectional findings for Switzerland from Walter (2010), showing 'losers' from globalization are more likely to vote for the Swiss Social Democrats. Margalit (2011) uses aggregate local voting share data to study whether applications for the Trade Adjustment Assistance (TAA) program in the United States that compensates workers suffering from trade competition shift vote shares. To date, only Geishecker and Siedler (2011) apply panel data to study the link between job insecurity to party identification, however mainly focus on the distinction between 'mainstream' versus far-left and far-right party identification. Counter to our inquiry, their findings lump together the German Conservative, Social Democratic and Green parties, all within the mainstream.

3. Data and method

We employ individual data from the original sample of the British Household Panel Survey (BHPS, 2009), which followed over 5,000 households and over 10,000 individuals annually for

eighteen years (1991-2009). Our sample taken from this survey consists of working age individuals of voting age (18-64), who report perceived job insecurity. Our dependent variable captures party support, and aggregates the following two questions for each year but 1992:

If there were to be a General Election tomorrow, which political party do you think you would be most likely to support?

[If R supports or is a little closer to one political party than another],Which one? (Party do you regard yourself as being closer to than the others)

Figure 5-1 gives the distribution of this variable over time, splitting respondents by stated support for (from left to right in the image) the Labour party, the Conservative party, the Liberal Democratic Party (henceforth Lib Dems), all other parties (including the Scottish National Party, Plaid Cymru and the Green Party) and no party support. Consistently, the share of respondents not supporting any party grows over time, from around 10% in 1991 to over 20% in 2008. Support for the Eurosceptic and right-wing populist political party UKIP was not included at the time of the questionnaire. We return to this issue in the conclusion.
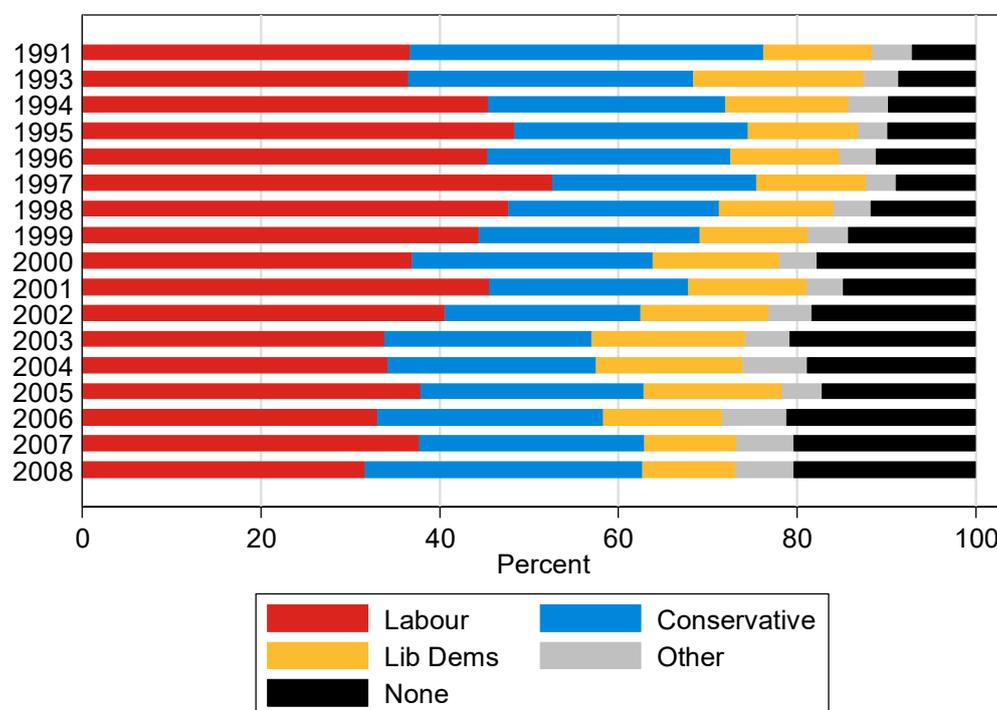

Figure 5-1: Party support by year

Our dependent variable of study captures party support between the Labour party on the one side and the Conservative party and Lib Dems on the other, covering most of the UK political landscape and roughly 70 to 85 percent of respondents. We choose to exclude individuals supporting other parties (Scottish National Party, Plaid Cymru, Green Party or other) from the analysis. The share of respondents supporting these parties is marginal, and including this group may introduce preferences along different political axes (e.g. regionalism). The variable takes on a value of one for support for the Labour party and value zero for the more centrist and right wing Lib Dems and Conservatives. Figure 5-2 gives an overview of this variable over time, showing the share of support for the Labour party (relative to support for the Conservative party and Lib Dems) to be greater among lower income individuals in all years. We note a large variance in the relative support for the Labour party over time, ranging from 35 and 60 percent of respondents (compared to support for the Lib Dems and Conservatives). Vertical lines indicate election years within our panel timeframe, where the markers indicate the actual share of votes received by the Labour party (again relative to the share of votes for the Conservatives and Lib Dems). On average, support for the Labour party is higher among the respondents compared to actual voting outcomes. As our sample consists only of working age individuals of voting age currently in employment, and therefore excludes retirees and the self-employed, this may overestimate general support for the Labour party.
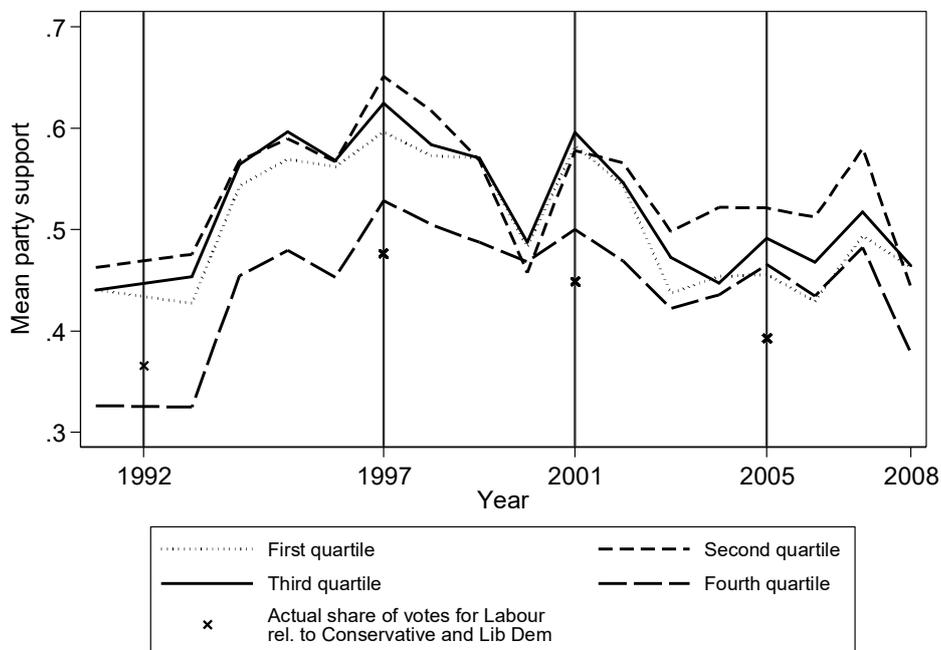

Figure 5-2: Fraction supporting the Labour Party relative to Conservative and Liberal Democratic party, by income quartile and year

Economic insecurity—our independent variable of interest, is operationalized as an individual's perception of employment risk. It is taken from respondents' answers to the following question, where respondents can answer on a (for our purposes reversed) scale from 1 (completely satisfied) to 7 (not satisfied at all):

> *"I'm going to read out a list of various aspects of jobs, and after each one I'd like you to tell me from this card (…) which number best describes how satisfied or dissatisfied you are with that particular aspect of your own present job. 4. Your job security"*

The question is only posed to employees that did paid work in the week before the interview, or did not, but had a job that they were away from. As we cannot observe job insecurity of individuals not active on the labor market at the time of response, attrition is a cause of concern. If those who report high job insecurity in early waves are more likely to drop out of the sample in later waves, due to e.g. unemployment, findings may be biased due to selection problems. Empirical work has shown such experienced job insecurity measures move in line with observed job loss rates. Schmidt (1999), for instance, shows aggregated workers' expectations about keeping their jobs closely follows the general unemployment rate. Next to correlating with job insecurity, unemployment rates may however also moderate the relationship between job insecurity and party support. Whilst job insecurity in a tight labor market (where the probability of re-entry is high) means workers insecure about their current job can relatively easily move on to a new one, job insecurity in a slack labor market (where the probability of re-entry is low) is expected to cause greater distress about future earnings, likely spurring a greater response in party support. This notion has also been proposed by Marx (2014), suggesting employability perceptions likely to correlate with occupational unemployment rates, moderate the relationship between job insecurity and preferences for redistribution.

In order to assess how occupational unemployment moderates the relationship between perceived job security and party preferences, we match respondents' occupational class (following the International Standard Occupational Classification, SOC) with its respective occupational unemployment rates (taken from ILO 2016). Figure 5-3 gives the relationship between mean reported job insecurity for each occupational unemployment rate in a specific year (we omit members of the Armed Forces from the graph for clarity, as they face relatively low occupational unemployment and low mean levels of perceived job insecurity). Overall, mean job insecurity is shown to increase with occupational unemployment. Within certain occupational classes, such as *Professionals*, *Clerks*, and *Technicians and Associate*

Professionals, however, this effect can be seen to be even stronger. Interestingly, workers in *Elementary Occupations*, as well as *Service Workers and Shop And Market Sales Workers* generally do not seem to respond strongly to increases in their occupational unemployment.
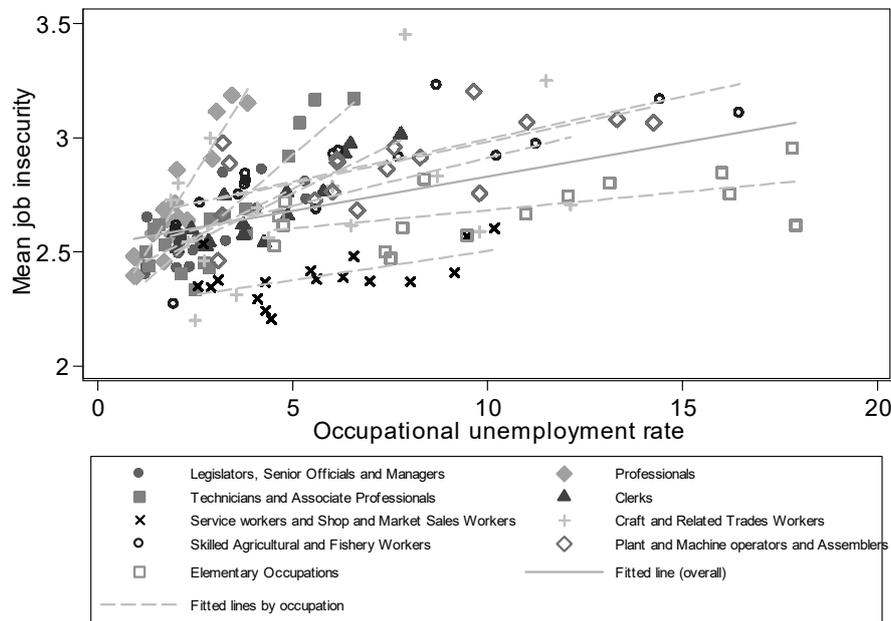

Figure 5-3: Mean job insecurity by occupational unemployment

As we are interested in the within-individual dynamics, Table 5-1 gives the so-called transition probabilities capturing the probability of transitioning from one job insecurity state to another, where the rows give initial values and columns reflect later years. Each year, 24.9 percent of respondents remained not satisfied at all (DIS) about their current job security. A far larger share (52.4 percent) remains completely satisfied (SAT) with the security of their job. The off-diagonal cells indicate shifts, where the upper right and left corner give the extremes: Ten percent of respondents yearly move from SAT to DIS, while only 1.4 percent of respondents move in the other direction.

Table 5-1: Transition probabilities for job insecurity

	1 SAT	2	3	NOT SAT / NOT DIS	5	6	7 DIS
1 SAT	52.4	32.0	8.0	3.0	2.3	1.0	1.4
2	16.6	54.1	17.9	5.0	3.9	1.4	1.1
3	7.7	36.5	31.2	11.4	9.0	2.7	1.7
NOT SAT / NOT DIS	6.4	24.5	25.5	22.7	13.0	4.9	3.1
5	4.6	19.0	22.6	14.9	23.9	9.1	6.0
6	4.8	16.3	16.6	12.5	23.3	13.2	13.4
7 DIS	10.0	15.8	12.3	9.0	16.2	11.9	24.9
Total	20.3	38.2	19.0	8.5	7.9	3.2	3.0

Generally, Table 5-1 finds more movements into the off-diagonal cells to the left compared to those in the right corner, implying overall job insecurity is decreasing in our time frame. This

also becomes clear in Figure 5-4, which now plots the mean response by income (in four quartiles) and year. We find both overall job insecurity and the heterogeneity between income quartiles to be greater in earlier years. The variable converges to a mean response of around 2.6 for all income quartiles. Contrary to expectations, job insecurity is highest for the upper half of the income distribution in nearly all years up to 2001. In the last two years of the survey the average insecurity of the lower half outgrows that of the higher half, albeit marginally.
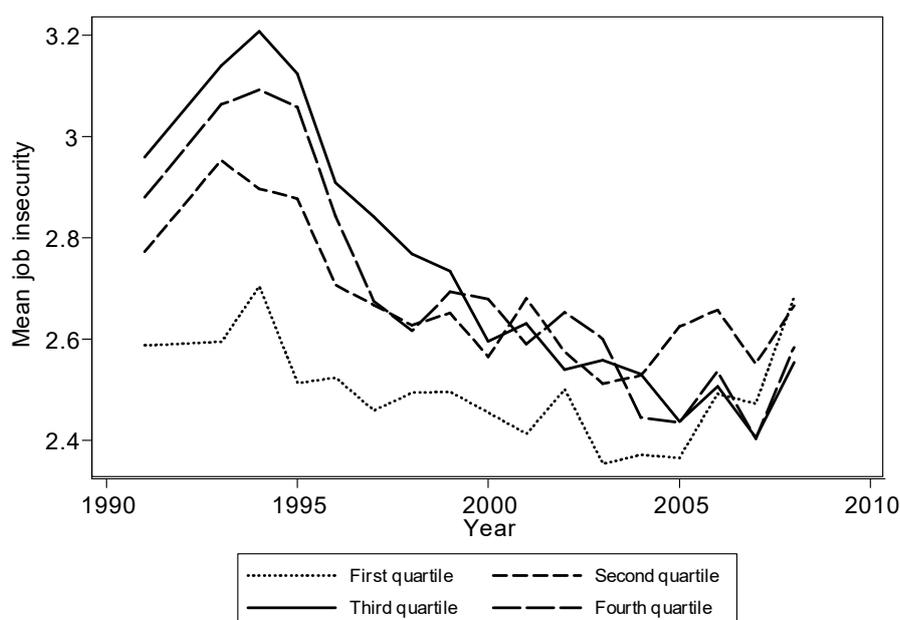

Figure 5-4: Job insecurity by income quartile and year

We exploit the above within-individual changes in occupational unemployment, along with all other variables using a Fixed Effects estimator. The approach is novel in the literature on job insecurity and voting, as most previous research employ cross sectional data (e.g. Walter, 2010; Marx, 2014; Rehm 2009). The added value is ridding findings of any time-invariant and individual-specific effects which may partly explain party support and correlate with job insecurity, such as one's political worldview or party identification (as suggested by Marx 2014), (socio-economic) background, or ability. As we have a limited dependent variable, we apply a Fixed Effects Logit Model (also termed the Conditional Logit model or Chamberlain's Conditional Maximum Likelihood Estimator (CMLE), see Chamberlain 1980; Greene 2012), which yields conditional probabilities of party support independent of time-invariant, individual-specific effects captured by α_i. We estimate (1), where y_{it} is a binary variable firstly indicating whether an individual i in period t supports the Labour party (and equals one), or the rivalling Conservative or Liberal Democratic party (and equals zero).

$$\Pr(y_{it} = 1 | \mathrm{x}_{it}) = \frac{\exp(\alpha_i + \mathrm{x}_{it}'\beta)}{1 + \exp(\alpha_i + \mathrm{x}_{it}'\beta)} \qquad (1)$$

The conditional likelihood function can be shown to be free of the α_i parameter. The vector x_{it} contains variables indicating perceived job insecurity, income (in 2005 GBP, in 1000 GBP) and occupational unemployment rates. Below we present a number of specifications, including different interactions between these variables. Throughout all regressions we correct for the income of the respondent's spouse, household size, stated membership of a workplace union, holding a public sector job and regional and time-fixed effects. All incomes are taken in 2005 prices.

4. Results

In order to test whether the individual specific heterogeneity captured by α_i affects consistency of estimates, we run a Hausman test comparing the usual maximum likelihood logit estimator with pooled data to Chamberlain's conditional maximum likelihood estimator (CMLE) (see Greene 2012). We can reject homogeneity at the 1% level, implying strong individual specific heterogeneity. Table 5-2 presents the exponentiated log odds for three specifications using the CMLE. The first specification tests whether there is a direct effect of job insecurity on party support. The second specification allows the effects of job insecurity to differ for different levels of occupational unemployment. The third specification interacts job insecurity, occupational unemployment rates and personal income, allowing effects of job insecurity to differ along incomes, given occupational unemployment rates. We included dummies for skill level, occupation and education level, yet omitted them as they were found to be jointly insignificant in explaining party support—likely due to limited within individual variation of these variables.

Specification 1 finds no direct effect of job insecurity on party support. Personal income does affect party support, albeit weakly. A 1000 GBP increase in income surprisingly increases the odds of supporting Labour by roughly 1%, holding all other variables (including the income of the respondents' spouse) constant. The sign of the coefficient is at odds with leading theories suggesting preferences of redistribution decrease in income. However, competing theories have suggested that upon introducing insurance motives (under specific assumptions about risk aversion), higher income may spur demand for income insurance (see Moene and Wallerstein 2004; Iversen and Soskice 2001). Occupational unemployment is found to directly influence party support: Ceteris paribus, a 1 percentage point increase in the unemployment rate within respondents' occupation increases the odds of supporting Labour by roughly 6%. Wald tests

are performed to test whether time and region are jointly significant, which is found to be the case. Time fixed effects capture an especially strong share of predicted party support, indicating shifts in party support are largely explained by variables outside the model.

Specification 2 allows for different marginal effects of job insecurity given occupational unemployment rates. Both the coefficient on job insecurity and its interaction with occupational unemployment now are significant, demonstrated by a significant Wald test on job insecurity. In order to grasp the joint effect, we predict the marginal effect of job insecurity along a range of occupational unemployment rates. As suggested above, the effect is significant only at relatively high levels of unemployment (above 6%), all other variables held at their respective means. Low occupational unemployment arguably weakens the relationship between job security and party preferences, meaning workers can relatively easily move on to a new job, whereas job insecurity in a slack labor market is expected to cause greater distress about future earning, spurring changes in party support. The magnitude of this effect is between a roughly 4% increase in the probability of supporting Labour at unemployment rates around 6 percent to around 25 percent for unemployment rates close to 15% (within wide confidence intervals). The background histogram depicts the empirical distribution of occupational unemployment throughout our timeframe. Note that at relatively low levels of unemployment the effect is even reversed: increases in job insecurity at unemployment rates below 3 percent actually decrease support for the Labour party.

Figure 5-5: Marginal effect of job insecurity on support for the Labour party by occupational unemployment

Finally, specification 3 interacts job insecurity and occupational unemployment with income. We can now test whether and how job insecurity affects individuals with different incomes, given levels of occupational unemployment and vice versa. Based on the AIC test, this model performs only slightly better than specification 2, implying the interaction with income does not add a lot of information. Jointly, however, job insecurity, occupational unemployment and income are all significant. Figure 5-6 gives the predicted marginal effects of job insecurity along a range of incomes for three levels of occupational unemployment (1%, 5%, 10% and 15%). Interrupted lines imply the effect is not significantly different from zero (at a significance level of 5%), while uninterrupted lines denote significant marginal effects. At very low to no unemployment in an occupation, we find that irrespective of one's income, job insecurity has no significant effect on party preferences. As occupational unemployment rates increase, the effects become significant along a wider range of incomes. At 5% unemployment, the probability of supporting Labour is between 5 to 20 percent higher from an income of around 30,000 GBP (in 2005 prices), holding other variables constant. At higher occupational unemployment rates the effect becomes significant along a wider range of incomes, while the effect grows in magnitude (increasing the likelihood between 10 to 40%).
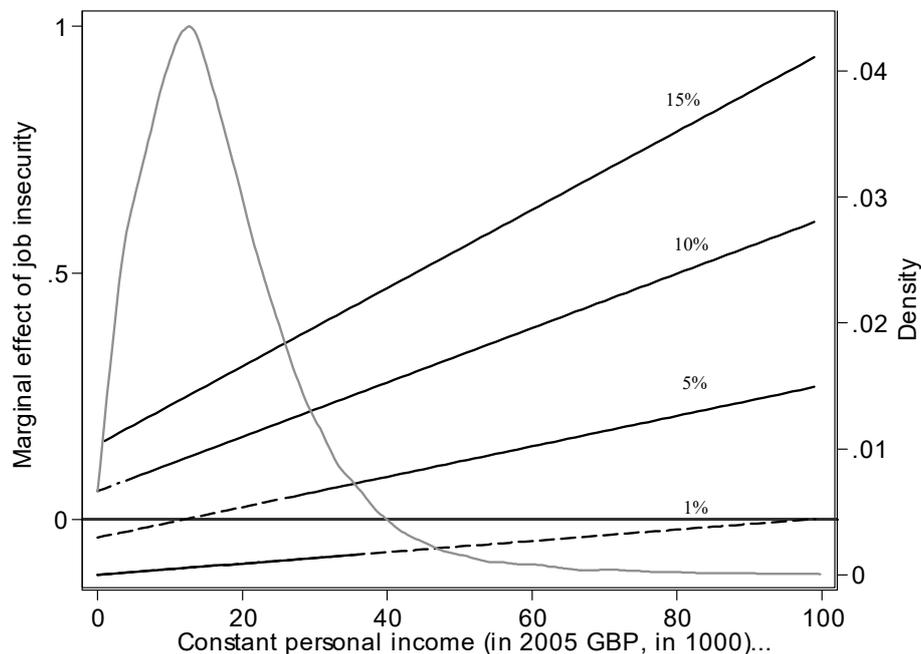

Figure 5-6: Marginal effect of job insecurity on support for the Labour party by income for four levels of occupational unemployment

Table 5-2: Fixed Effects Logit estimates of support for the Labour party (vs. Conservative and Lib-Dem)

	FE 1	FE 2	FE 3
Job insecurity	1.019	0.899***	0.877***
	(1.13)	(-3.79)	(-2.80)
Constant personal income (in 2005 GBP, in 1000)	1.010***	1.010***	1.012**
	(3.46)	(3.36)	(2.12)
Occupational unemployment	1.059***	0.988	1.017
	(4.49)	(-0.68)	(0.66)
Job insecurity × Occupational unemployment		1.024***	1.019***
		(5.62)	(2.59)
Job insecurity × Constant personal income (in 2005 GBP, in 1000)			1.001
			(0.36)
Occupational unemployment × Constant personal income (in 2005 GBP, in 1000)			0.997**
			(-2.09)
Job insecurity × Occupational unemployment × Constant personal income (in 2005 GBP, in 1000)			1.000
			(1.30)
Works in public sector	1.082	1.074	1.074
	(0.81)	(0.73)	(0.73)
Number of members in the household	0.999	0.999	0.996
	(-0.03)	(-0.03)	(-0.13)
Member of workplace union	1.126	1.127	1.127
	(1.60)	(1.61)	(1.61)
Spouse income	1.000	1.000	1.000
	(0.04)	(0.01)	(0.03)
AIC	10163.206	10133.160	10131.329
BIC	10415.347	10392.941	10414.032
Wald test			
Job insecurity		32.859***	38.765***
Occupational unemployment		51.133***	58.301***
Income			18.995***
Time	1036.402***	1039.656***	1041.918***
Region	52.608***	52.686***	53.846***
Marginal effects (at the mean, income at median if not stated otherwise)			
Job insecurity (income at 10th percentile)			-0.026
Job insecurity (income at 25th percentile)			-0.013
Job insecurity (income at median)		0.008	0.004
Job insecurity (income at 75th percentile)			0.027
Job insecurity (income at 90th percentile)			0.056**
Income			0.008**
Occupational unemployment		0.051***	0.044***
χ^2	1295.770***	1327.816***	1335.647***
Pseudo-R^2	0.114	0.117	0.117
N	15377	15377	15377

Exponentiated coefficients; t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Year and regional fixed effects included in all regressions.

Results prove robust to different specifications regarding the job insecurity variable. Both in a specification using categorical dummies for the different reported levels of job insecurity, rather than treating job insecurity as a continuous variable, as for a fixed threshold scale, dichotomizing job insecurity (where responses higher than 4 on the seven-point scale are interpreted to be insecure) we find evidence that higher perceived job insecurity spurs changes in party support at relatively high levels of occupational unemployment. Figure 5-7 reports the marginal effects using the categorical interpretation of job insecurity for four levels of occupational unemployment. Interpretation is relative to complete stated job security, where we again find at low occupational unemployment rates (one and five percent) higher reported job insecurity do not spur changes in party support. At occupational unemployment rates of 10 to 15 percent, compared to full security, those reporting some or complete insecurity are more likely to support Labour relative to the Conservative party or Lib Dems. Figure 5-8 gives the marginal effects for the dichotomized interpretation of job insecurity. The figure is similar to Figure 4-5, while the noted effects here are even stronger than before. Both robustness checks show findings are not a mere artefact of within individual movements from 'very secure' to 'secure' jobs, but indeed follow from movements from insecure to secure jobs (and vice versa).
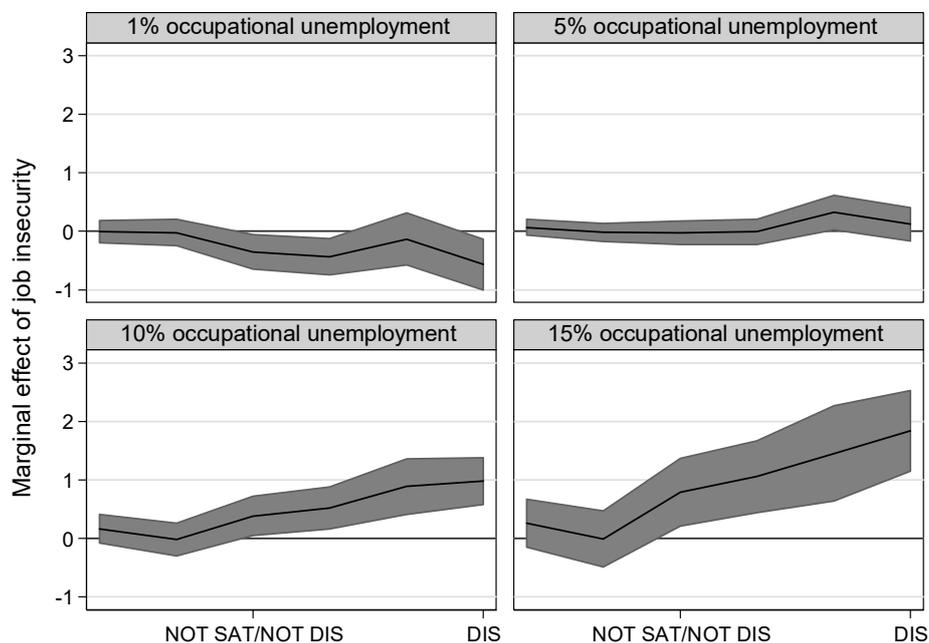

Figure 5-7: Marginal effects of job insecurity (relative to complete security) on support for the Labour party for four levels of occupational unemployment
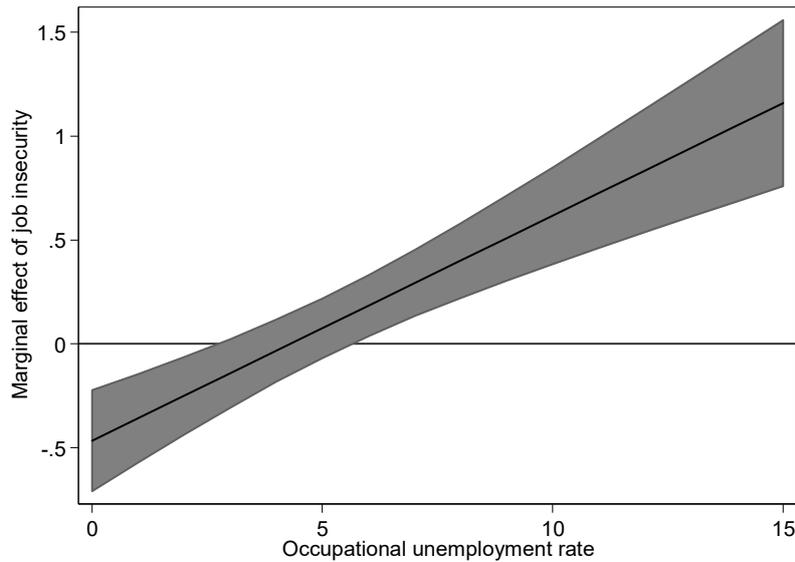
Figure 5-8: Marginal effects of job insecurity (relative to a secure job) on support for the Labour party by occupational unemployment

Support vs. voting

Can changes in party support affect actual election outcomes? We run a multinomial logistic regression with Fixed Effects (Pforr 2014), predicting voting in actual elections, including absence at the ballot box. The estimated model is similar to that above in (1), while now the dependent variable y_{it} can take on j categories, and are interpreted relative to base category B.

$$
\begin{cases}
\Pr(y_{it} = j | x_{it}) = \dfrac{\exp(\alpha_{ij} + x'_{it}\beta_j)}{1 + \sum_{k=1,k \neq B}^{J} \exp(\alpha_{ij} + x'_{it}\beta_j)} & \text{for } j \neq B \\[3ex]
\Pr(y_{it} = B | x_{it}) = \dfrac{1}{1 + \sum_{k=1,k \neq B}^{J} \exp(\alpha_{ij} + x'_{it}\beta_j)}
\end{cases}
\tag{2}
$$

Our period of inquiry includes four general elections (April 1992, May 1997, June 2001, and May 2005). As elections are all in the first half of the year while questionnaires are admitted throughout the year (with questions on voting asked retrospectively after elections), we use the one-period lagged values for the independent variables for those voters surveyed *after* the general election. Table 5-3 again gives the transition probabilities from year to year in which there were general elections. We subsume all small parties under a category of 'other'. Most voters consistently vote for a specific party, as can be seen from the values on the diagonal: This loyalty is highest among Labour voters (over 70%), followed by voters for the Conservative party (62%), Lib Dems (50.6%) or other parties (39%). Similarly, non-voters are less likely to vote in subsequent elections (over 70% do not). Transitions however do occur: Of those that voted Conservative, 10.5% votes Labour in the next election (while only 2.7 percent

of eligible voters does so vice versa). Non-voters generally move to Labour in subsequent elections (12%), and less so to the other parties (8% vote Conservative, 6.6% Lib Dems). Figure 5-9 gives the voting results by election year for our sample.

Table 5-3: Transition probabilities for voting

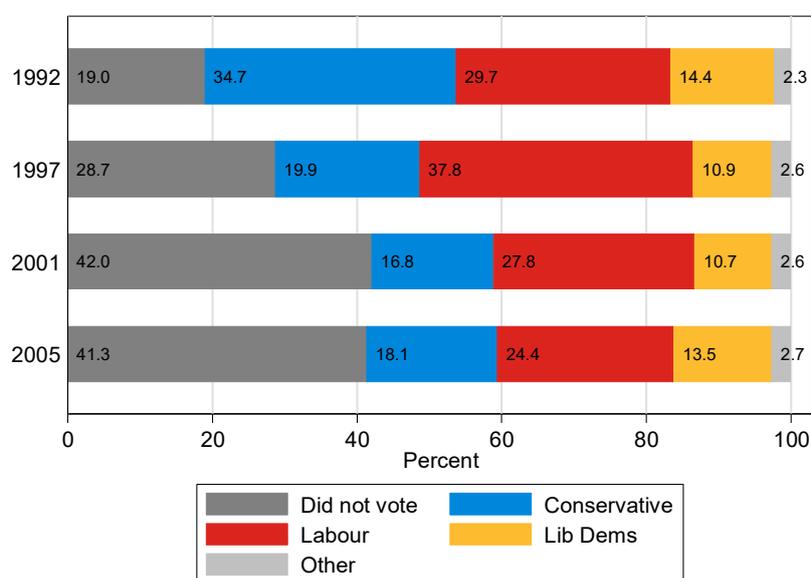|	Did not vote	Conservative	Labour	Lib Dems	Other
Did not vote	71.5	8.0	12.4	6.6	1.5
Conservative	19.3	61.8	10.5	7.2	1.1
Labour	18.8	2.7	70.4	6.2	1.9
Lib Dems	19.8	8.2	19.1	50.6	2.3
Other	23.9	7.5	15.0	14.6	39.0
Total	33.5	19.7	31.8	12.4	2.6

Figure 5-9: Voting shares by election year

Table 5-4 gives the exponentiated log odds predicting voting behavior, where the base category is the Conservative party. Time, union membership and holding a public sector job significantly predict voting behavior relative to the Conservative party, depending on the vote choice. Only the interaction between occupational unemployment and job insecurity is significant (at the 5 percent level) for Labour voters relative to Conservative voters.

Table 5-4: Multinomial logistic fixed effects estimates of voting

	Did not vote	Labour	Lib.Dem./SLD	Other
Job insecurity	0.974	0.900	1.006	1.033
	(-0.32)	(-1.19)	(0.07)	(0.20)
Occupational unemployment	1.038	0.959	0.958	1.036
	(0.72)	(-0.74)	(-0.68)	(0.34)
Constant personal income (in 2005 GBP, in 1000)	0.997	1.004	1.002	1.016
	(-0.44)	(0.62)	(0.31)	(0.80)
Occupational unemployment × Job insecurity	1.010	1.035**	1.007	1.007
	(0.69)	(2.32)	(0.42)	(0.29)
Member of workplace union	1.121	1.236	1.698**	0.918
	(0.56)	(1.01)	(2.36)	(-0.21)
Works in public sector	1.756**	1.980**	1.168	1.193
	(2.15)	(2.37)	(0.53)	(0.35)
Year: *(2005 as reference year)*				
1992	0.105***	0.212***	0.332***	0.248***
	(-11.70)	(-7.69)	(-5.29)	(-3.60)
1995	0.597***	2.132***	0.857	1.139
	(-2.64)	(3.59)	(-0.69)	(0.31)
2001	1.516***	1.742***	1.014	1.346
	(3.05)	(3.64)	(0.09)	(1.05)
Regional fixed effects	Included			
N	5589			

Exponentiated coefficients; t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In order to gauge the overall effect of job insecurity, we again give the marginal effect of job insecurity on voting choice by occupational unemployment rate. Figure 5-10 gives this effect for the Labour party, Lib Dems, other parties and non-voting, all relative to voting Conservative. Interrupted lines imply the effect is not significantly different from zero (at a significance level of 5%), while uninterrupted lines denote significant marginal effects of job insecurity. Findings mirror those from above for party support, as increases in job insecurity at unemployment rates above 6% increase the probability of voting Labour relative to voting Conservative by between 8 to 25% (with widening confidence intervals). Given occupational unemployment, job insecurity does not seem to push voters to vote Lib Dems or vote for other parties, or not vote at all, as differences are insignificant along the entire range for the other three categories.
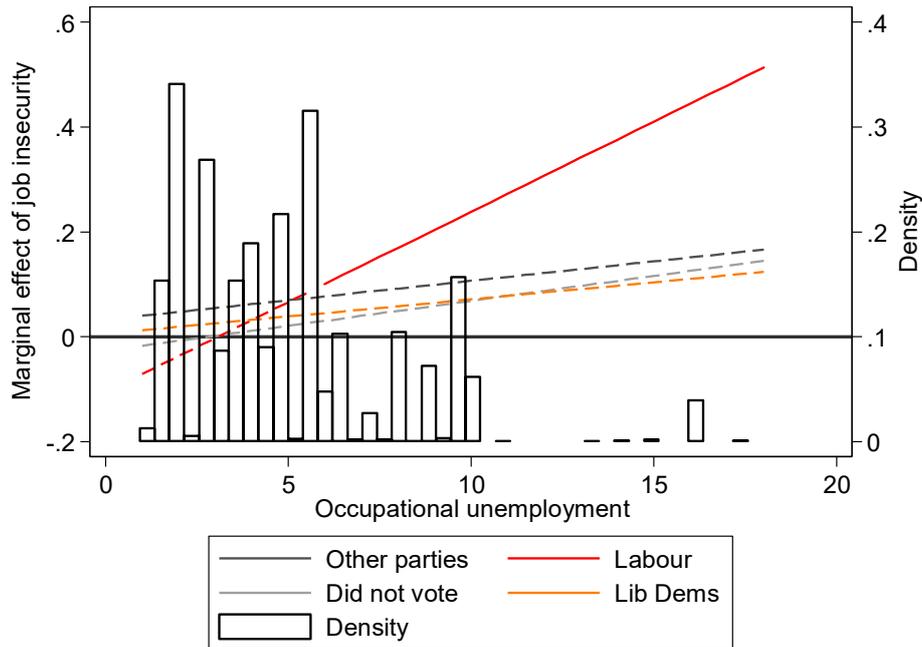
Figure 5-10: Marginal effect of job insecurity on voting Labour party by occupational unemployment on voting decision

Findings for Germany

We use SOEP (2014) data to assess the effects of job insecurity on party support for Germany. While the BHPS data did not include self-assessments of job market prospects, leading us to opt for sectoral unemployment levels, German data does evaluate respondents' job market prospects in addition to their job insecurity. Subjective job market prospects are arguably better at picking up employment prospects than objective indicators, such as sectoral unemployment.

Earlier work by Geishecker and Sielder (2012) studies shifts in party identification from mainstream to extremist left- and right-wing parties for Germany, while the analysis here rather focuses on changes within mainstream party support. We follow their definition of parties outside the mainstream, excluding PDS/Die Linke on the left, and NPD, DVU, and Die Republikaner on the right. Furthermore, the West and East German samples are analyzed separately, as do Geishecker and Sielder (2012).

Figure 5-11 and Figure 5-12 give the distribution of party support among the four included parties relative to the proportion of individuals indicating they do not support a specific party. This latter share is growing over time for the Western German sample, as in the British case, reaching over half of respondents in 2013. For the East German sample this proportion is even greater and stays rather constant at around 70 percent of respondents.
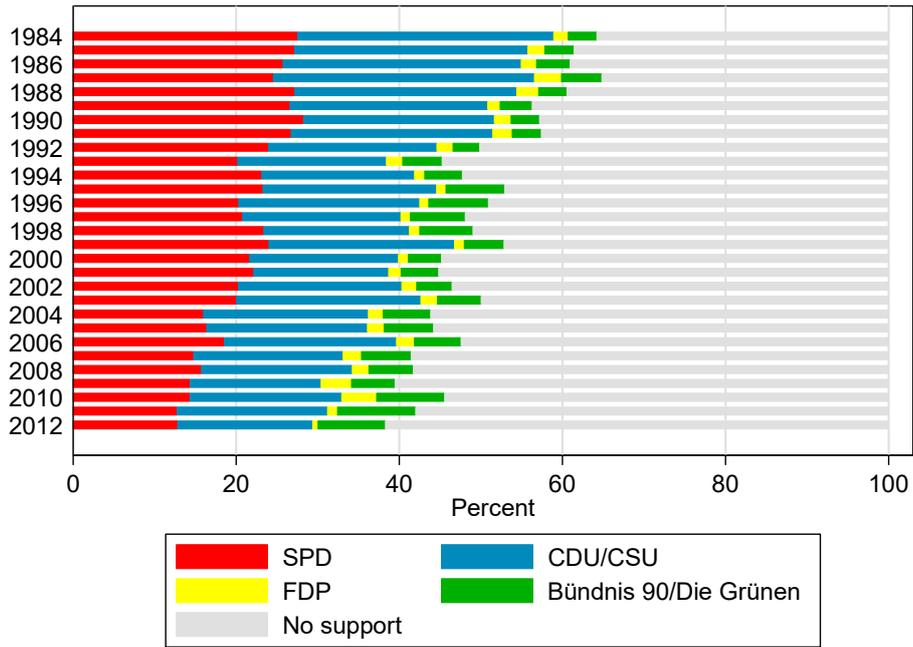
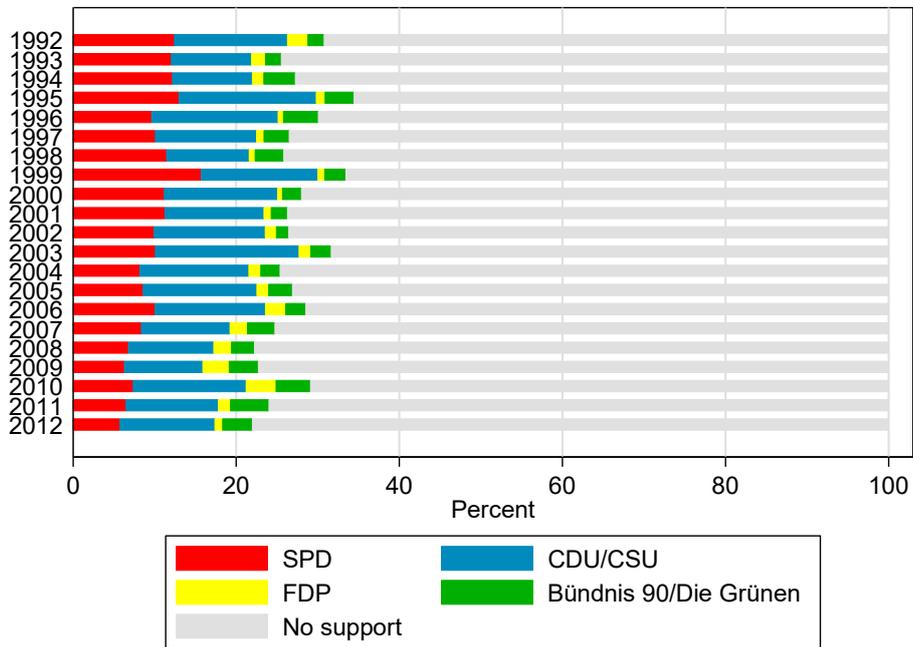Figure 5-11: Party support among West German sample

Figure 5-12: Party support among East German sample

Figure 5-13 and Figure 5-14 give the share of left-wing party support, as operationalized above as party support for SPD or Bündnis 90/Die Grünen relative to CDU/CSU or FDP party support for the four income quartiles of both samples jointly. In the East German sample there is no

clear relationship between income position and party support, while the West German sample shows lower support among the highest income quartile for left-wing parties (between 40 and 50%). Vertical lines denote election years.
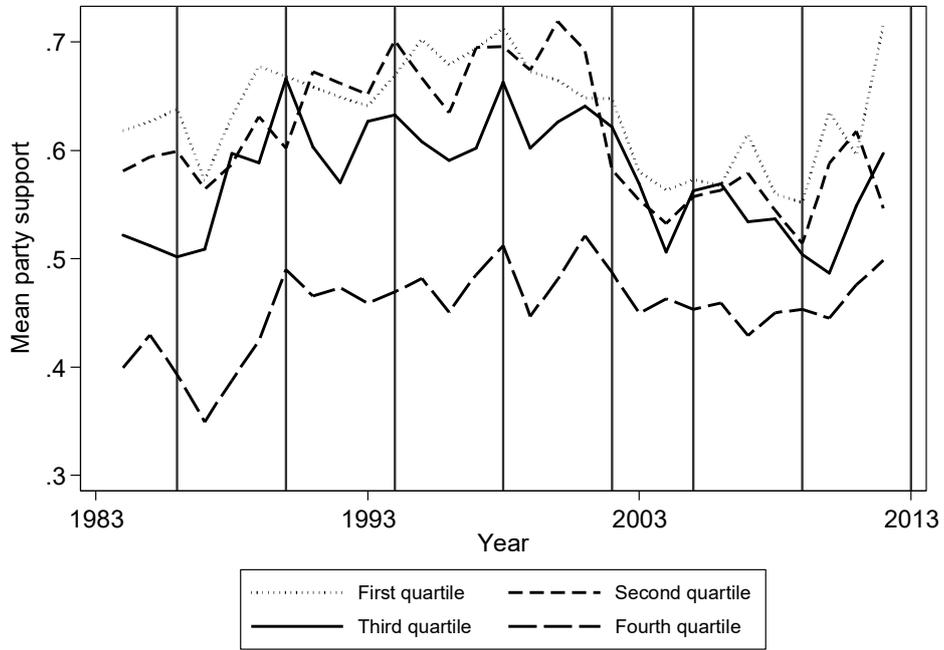

Figure 5-13: Left wing block party support under West German sample by income quartile
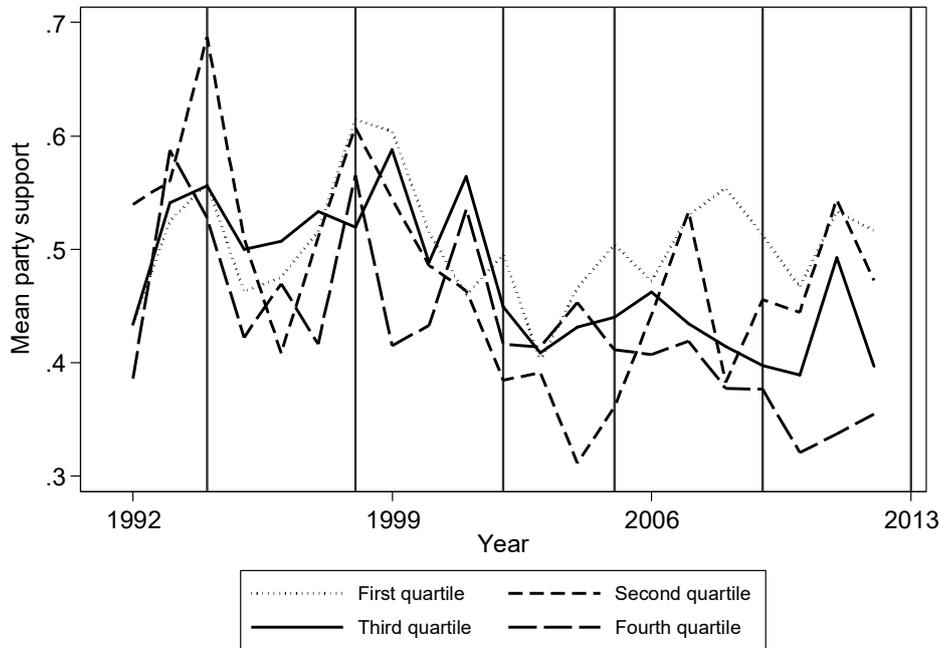

Figure 5-14: Left wing block party support under East German sample by income quartile

The main dependent variable job insecurity is measured on a three-point scale, where respondents are asked to what degree they worry about their job security. Answers can range from 'very concerned' (3) and 'somewhat concerned' (2) to 'not concerned at all' (1). Figure 5-15 and Figure 5-16 trace the mean of this variable for both samples. For the West German sample, mean levels for all income classes sit between 'somewhat concerned' and 'not concerned'. For the East German sample, job security can be seen to more strongly correlate with income, where across time job security is higher, the higher the income quartile one belongs to. On average, job insecurity decreases over time for this sample.
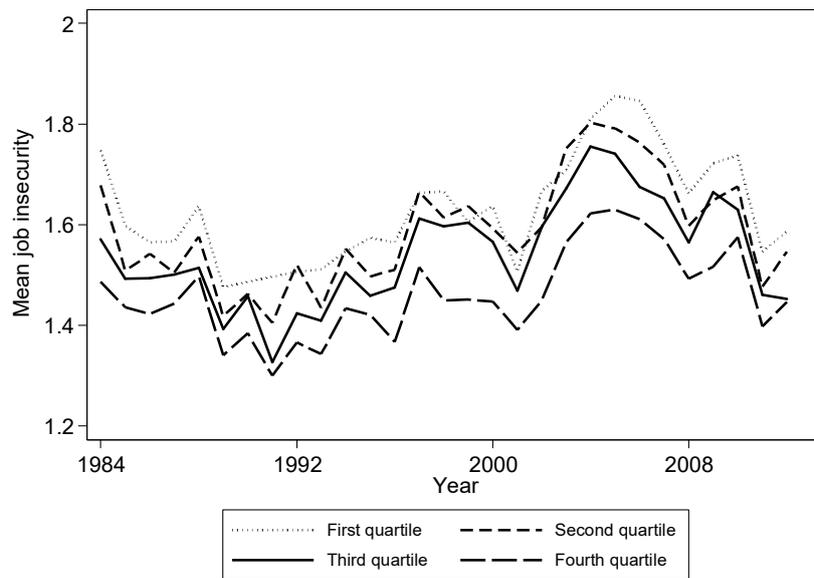

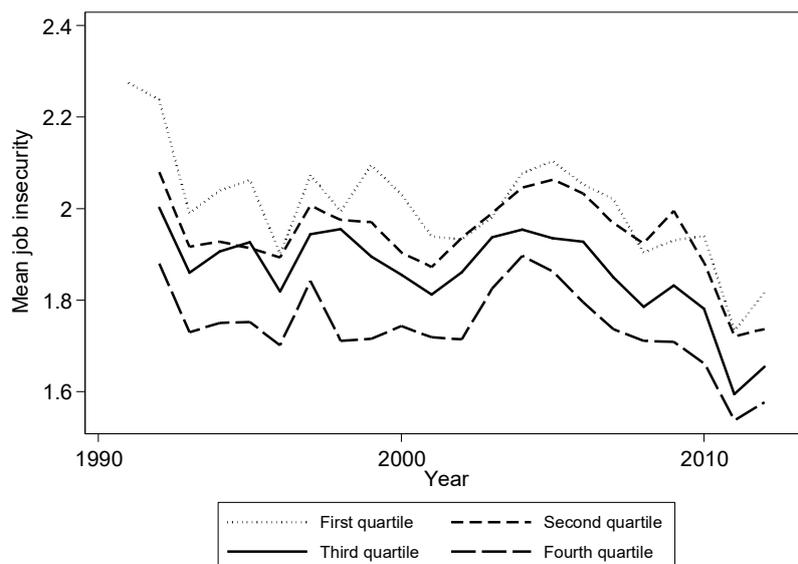Figure 5-15: Average job insecurity among West German sample by income quartile

Figure 5-16: Average job insecurity among East German sample by income quartile

Transition probabilities for both samples in Table 5-5 and Table 5-6 show those unconcerned about job insecurity largely remain unconcerned in both samples (77.9% in West German sample, 62.7% in East German sample). Inversely the same on average holds: those concerned generally remain so. Off-diagonal cells indicate movements between perceived security and insecurity. For the West German sample there appear to be greater transitions from insecurity to security than for the East German sample, where the opposite seems to hold.

Table 5-5: Transition probabilities for West German sample

	Not concerned	Somewhat concerned	Very concerned
Not concerned	77.9	19.3	2.8
Somewhat concerned	32.0	56.5	11.5
Very concerned	17.8	42.4	39.8
Total	56.4	34.2	9.3

Table 5-6: Transition probabilities for West German sample

	Not concerned	Somewhat concerned	Very concerned
Not concerned	62.7	32.0	5.3
Somewhat concerned	19.2	63.7	17.1
Very concerned	8.6	36.2	55.2
Total	28.7	48.4	22.9

Table 5-7 and Table 5-8 relate perceived job insecurity to perceived employment prospects. In both samples, χ^2 tests indicate the two variables are dependent: higher job insecurity and worse job prospects generally go hand in hand. However, for the West German sample, still a majority of those claiming it to be almost impossible to find a new job are not concerned about their job security (55.4%). This is very different for the East German sample, where the relationship between both variables is stronger: Here those that feel it is almost impossible to find new work are generally either somewhat or very concerned about their job security (40.2 and 36.4% respectively).

Table 5-7: Relationship between job insecurity and subjective employment prospects for the West German sample (in %)

	Not concerned	Somewhat concerned	Very concerned
Easy	73.5	22.6	3.9
Difficult	47.3	42.2	10.5
Almost impossible	55.4	30.1	14.5
Total	55.4	35.1	9.5

Table 5-8: Relationship between job insecurity and subjective employment prospects for the East German sample (in %)

	Not concerned	Somewhat concerned	Very concerned
Easy	56.3	35.8	8.0
Difficult	23.9	53.4	22.7
Almost impossible	23.4	40.2	36.4
Total	28.4	48.1	23.5

For analytical purposes, job security is dichotomized, where those who report some or very much concern over job insecurity are defined as reporting job insecurity, while those reporting no concern are defined as job secure. Regressions predict support for left-wing parties SPD and Bündnis 90/Die Grünen relative to CDU/CSU and FDP. Explanatory variables include the dichotomized perceived job insecurity and employment prospects, together with gross household income (in 1000 EUR), number of household members, and survey year. As above, the first regression specification analyzes job security and employment prospects separately, while the second specification includes an interaction between the two variables.

Table 5-9: Fixed Effects Logit estimates of support for the SPD and Bündnis 90/Die Grünen relative to CDU/CSU and FDP

	West German sample		East German sample	
	FE 1	FE 2	FE 1	FE 2
Job insecurity	0.952	1.115	0.986	0.841
	(-0.52)	(0.62)	(-0.07)	(-0.41)
Find a suitable position (ref. cat. *Easy*)				
Difficult	1.227[*]	1.373[**]	0.999	0.835
	(1.88)	(2.45)	(-0.00)	(-0.53)
Practically impossible	1.278	1.203	1.534	1.848
	(1.57)	(0.98)	(1.17)	(1.34)
Job Insecurity × Difficult to find a suitable position		0.748		1.416
		(-1.45)		(0.73)
Job Insecurity × Practically impossible to find a suitable position		1.073		0.766
		(0.27)		(-0.45)
Gross household income (in 1000 EUR)	0.989[***]	0.988[***]	0.961[***]	0.961[***]
	(-3.39)	(-3.42)	(-5.20)	(-5.12)
Year fixed effects		Included		
AIC	3333.903	3333.956	777.821	779.626
BIC	3503.778	3516.898	884.484	896.447
Wald test				
Job insecurity		4.215		2.183
Employment prospects	3.779	7.698[*]	2.558	4.684
Year	140.261[***]	139.567[***]	53.716[***]	54.355[***]
χ^2	173.663[***]	177.610[***]	106.366[***]	108.560[***]
Pseudo-R^2	0.050	0.051	0.126	0.129
N	5083	5083	1187	1187

Exponentiated coefficients; *t* statistics in parentheses, [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

Similarly to findings for the UK, German data finds no robust effect of job insecurity alone on party support within mainstream parties in either the West or East German sample. Interacted with employment prospects in specifications FE2, however, still no significant effects of job insecurity are found, contrary to British findings. This becomes clear when

evaluating Figure 5-17 and Figure 5-18, giving the effects of increased job insecurity for the three levels of employment prospects within 90% confidence intervals.

Employment prospects alone appear only weakly able to explain party support decisions in the West German sample, where the odds of voting a left wing party grow by a factor 1.23 if respondents feel it will be difficult to find a suitable position, relative to those respondents who feel this will be easy. Jointly, however this variable is insignificant in both samples, as shown by the joint F-test. This joint insignificance is driven by the fact that among those that feel chances of finding a suitable position are practically impossible relative to those feeling it will be easy to acquire a suitable position, no significant effects on party support are found. The coefficient on household income shows that the odds of supporting left wing parties decrease with increases in income in both the West and East German panel. A 1000 EUR increase in gross household income reduces the odds of voting left wing by a factor 0.989 or 0.961 in the West and East German panels, respectively. Finally, as the joint F-test on time dummies (coefficients not displayed) makes clear, time effects again are very strong predictors in explaining party support.

In conclusion, while in British findings above show increased job insecurity and worsening employment prospects (measured by sectoral unemployment) jointly can move voters to shift their party support between the mainstream parties, for Germany no such effect is found. As Geishecker and Sielder (2012) find job security does move voters' party support from inside to outside the mainstream political spectrum, this may imply such individual economic uncertainties are channeled outside, rather than within the political mainstream in Germany. A further explanation lies in the fact that overall party support in the German sample is found to be lower than in the UK, especially in the East German sample—possibly also a result of the manner in which the question was framed. Those German respondents that did indicate a preferred party furthermore are less prone to move between the mainstream parties, decreasing variability in the dependent variable, in itself telling of differences in the political attitudes of voters between the two countries.
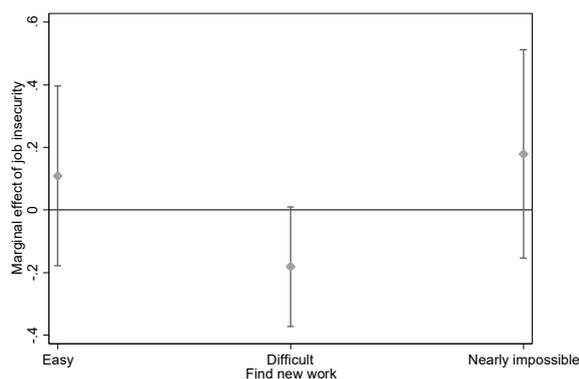
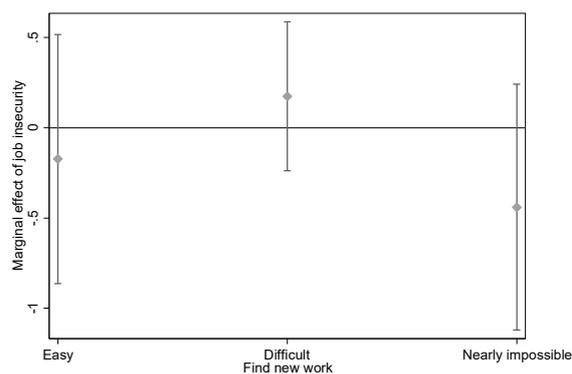Figure 5-17: Marginal effect of job insecurity among West German sample

Figure 5-18: Marginal effect of job insecurity among East German sample

5. Conclusion

Two competing accounts predict globalization's effect on the welfare state. The compensation hypothesis firstly suggests welfare states may expand, as governments seek to compensate an increasing group of potential losers of globalization. The constraint hypothesis argues welfare states will retrench, as globalization reduces states' room for maneuver, causing downward pressure on government revenues. While studies at the macro level have shown welfare states are robust in the face of globalization, to date no micro level study has assessed the aggregate effect of both hypotheses at the voting booth within a rigid framework able to correct for individual-specific heterogeneity in variables such as political orientation or worldview, party identification, one's (socio-economic) background or ability.

We firstly test whether and how job risks associated with increased international competition affect party support and voting for a sample of British respondents between 1992 to 2008. We find evidence of compensation, noting a strong moderating effect of occupational unemployment. Job insecurity only spurs changes in party support or voting behavior if met by high occupational unemployment rates (above 6%). This notion has also been proposed by Marx (2014), suggesting employability perceptions—likely to correlate with occupational unemployment rates, moderate the relationship between job insecurity and preferences for redistribution. Throughout the timeframe of our study, respondents in all occupations but the highest income occupations of *Legislators, Senior Officials and Managers* and *Professionals* faced such high occupational unemployment, suggesting it is mainly middle and low income occupations driving this effect. Interacting this joint effect of occupational unemployment and job insecurity with income shows that as income grows, changes in party support at high unemployment rates become more profound. This corresponds to theoretical findings showing

that insurance motives may spur higher demand for income insurance with increases in income (see Iversen and Soskice 2001).

The especially strong importance of time in our regressions points at possible important effects of changes *within* the parties over time. The salience of job security or economic issues altogether may be overtaken by other policy fields also affecting voting behavior and party support (e.g. Labour's support for the Iraq war in 2003). This may partly be a function of the constraint hypothesis, as Hellwig (2014) argues perceptions about governments' room for maneuver may move electoral demands from policy fields constrained by globalization to those less or not constrained by these forces. Our findings should be interpreted as the aggregate effect of both hypotheses, as at the micro level the compensation and constraint logics may cancel each other out. Given the competing logics of both hypotheses, we still find evidence for the compensation.

In repeating the analysis for Germany, findings appear to be largely country-specific. No effects linking job insecurity and worsening employment prospects to shifts in party support between the mainstream parties are found for Germany. German voters may channel individual economic uncertainties outside, rather than within the political mainstream. Secondly, overall party support in the German sample is found to be lower than in the UK, especially in the East German sample. Within this smaller fraction of respondents supporting a specific party, individuals are found to be far less prone to move between the mainstream parties. Such differences in party loyalty despite economic conditions may be an important driver of differences in the political attitudes of voters between the two countries, and warrants further cross-country comparison.

Our findings however do show signs of overall declines in party loyalty and support in both countries, and increasing absenteeism at the ballot box. Future studies should lay bare whether these findings over the period 1992-2008 still apply today, or whether third-party voting or non-voting are more profound among job insecure workers today. Studying the post-crisis years in which occupational unemployment rates again rose are useful in this respect. The rise of populist parties, candidates and movements throughout the world which seek to capture part of the electorate dealing with such economic uncertainties described in this chapter necessitate further empirical work. As we cannot observe the job insecurity of unemployed individuals, attrition remains cause of concern. Future studies could use similar methods to study the effects of movements in and out of employment, and movements along types of jobs, e.g. from steady to more precarious jobs.

Chapter 6: **The Labor Managed Firm: Permanent or Start-Up Subsidies?**[38]

Abstract: Policies designed to reduce income differentials before taxation preempt the need for extensive tax-and-transfer programs. One of the prime examples of such policies is the promotion of labor managed firms, which is found to reduce interfirm wage differences and among other things offers residual claimancy rights to employees. Given a range of market failures that persist in the present-day capitalist firm, we explore a novel argument of why this alternative of the labor managed firm is largely absent and argue public intervention should primarily be aimed at the start-up phase of labor managed firms rather than providing permanent tax subsidies. We derive the crucial condition for the emergence of labor managed firms, and show that this condition is unduly restrictive from an efficiency point of view.

1. Introduction

The predominance of the capitalist firm (henceforth KMF) over the labor managed firm (henceforth LMF) is a striking feature of Western economies, given Samuelson's (1957) equivalence between capital hiring labor or labor hiring capital. In an interview in *Juncture* (2014), Piketty claimed revisiting property relationships and involving workers in the ownership and management of their company to be complementary to other measures such as a wealth tax in fighting rising levels of inequality. In a similar vein, Blasi et al. (2013) argue for more profit sharing and employee ownership. Questions of equity and democracy aside, many authors (e.g. Klein 1987; Kruse 1992; Kandel and Lazear 1992) have put forth efficiency arguments for further reaching democratic and return rights for employees. Especially the inability to specify complete labor contracts gives rise to socially costly monitoring expenses faced by the KMF, unable to meet welfare enhancing combinations of higher pay and higher effort by its employees relative to the LMF (Bowles and Gintis 1993).

Proponents of LMFs however face an analytical dilemma, since if the LMF is superior, then why does the LMF not thrive in a competitive environment (Dow 1993)? Moving beyond existing arguments on wealth and credit constraints or risk aversion on behalf of employees to explain the prevalence of the KMF over the LMF, we engage in a novel argument recently put forth by Schwartz (2012). The question of the largely absent LMF is not so much the question of why LMF do not thrive in market economies, but why so few are started to begin with. In

his account the organizational form of a LMF is as a public good, the benefits of which (among them residual claimancy, job security and participation in decision-making) are shared between workers. To explain the absence of LMFs we should therefore first and foremost study possible collective action problems in the start-up phase.

In this contribution we set out to formalize and expand upon this insight, offering a game theory analytical framework to judge both whether and what kind of government intervention may be warranted. Section 2 contrasts the LMF to the KMF, defining a firm in which both control and return rights rest with labor as the LMF, while in the KMF these rest with the suppliers of equity finance or owners of its physical assets. Section 3 discusses a number of market failures arising in the KMF and the mechanisms through which the LMF may be able to overcome them. In section 4 we provide a short overview of existing explanations for the absence of LMF and engage in a novel argument that the absence of LMFs is due to its organizational structure being a public good for the prospective workers. We present this argument in an analytic framework using the extensive form from game theory. The policy implications are discussed in section 5. To address collective action problems in the start-up phase of the LMF, we suggest both standardization and start subsidies may reduce the costs of setting-up LMFs and overcome the prevalent collective action problems.

2. Defining the LMF along the axes of control and return rights

Dow and Putterman (1996) define the organizational structure of a firm by asking the question which party controls the firm. In a pure KMF, control rests with the suppliers of equity finance or owners of its physical assets. In contrast, in the pure LMF suppliers of non-managerial and managerial labor share formal control rights. Besides the right to control the use of an asset, there is also the right to the returns of the firm. According to Ben-Ner and Jones (1995: 532-533), owning a firm on the one hand means 'determining the objectives of an organization, the positions people occupy, the functions of these positions, who occupies them and how their occupants are induced to carry out their functions', while on the other hand it entails enjoying the 'financial and physical payoffs generated from the operation of the organization (…) distributed as profits, wages, working conditions, or through output quality and price'. Beyond what they refer to as the 'conventional firm', which we label as the KMF, three major 'shades of grey' exists: Firms that share profits, firms with employee share ownership programs (ESOP) and firms organized as (producer) cooperatives, which we label as LMFs. Differences between firms in the same product market may exist when moving east or south in Table 6-1, yet as Pencavel (2012) argues, there may be an argument for complementarity between both

dimensions, suggesting a south-eastern movement may affect the firm's operation most, as it is the interaction between both dimensions that matters. Control rights may thus be more effective on the performance of a firm if coupled with return rights, and vice versa. In the analysis that follows we restrict ourselves to the two extremes in both corners: the LMF (with both full control and return rights for employees) and the KMF (with no control and return rights for employees).

Table 6-1: Ownership structures along the axes of control and return rights

		Control rights held by employees			
		None	*Participation in Control*	*Sharing of Control*	*Dominant Control*
Return rights held by employees	*None*	The conventional firm, KMF	Quality circles involving majority of workers	Employee representation on board of directors	Common Ownership
	Small	Profit sharing	Profit sharing with participation program	Co-determination	Retail cooperatives
	Moderate	ESOP	Scanlon Plan	Producer cooperative	Producer cooperatives
	Majority	ESOP	ESOP	ESOP	Producer cooperatives, LMF

taken from Ben-Ner and Jones (1995)

The LMF makes up only a small share of firms in Western economies. Although figures differ across studies, largely because of different definitions,[39] Fakhfakh et al. (2009) reports 1,900 worker cooperatives in France in 2008, representing only around 0.2% of all firms at that time. Cooperatives UK (2013) counted 497 worker owned cooperative businesses, with around 84,000 members (for firm entry of LMFs in the UK, see Podivinsky and Stewart 2007). Data for the United States show only 223 worker cooperatives with an average of 11 employees each, concentrated mainly in arts, media and books industries (Artz and Kim 2011). Schwartz (2012) argues this number to be negligible, as in 2009 almost 553,000 new firms started their operations in the Unites States. Countries with relatively larger cooperative sectors are Spain, with 16,800 worker cooperatives in 2011 and nearly 80% of them situated in the service and construction sector, covering roughly 200,000 worker members (CECOP 2012) and Italy with around 31,400 production cooperatives in 2008 (Zanotti 2012), leading Europe in number and share of the cooperative worker sector. Overall, however, the picture is that the LMF is a marginal phenomenon.

---

[39] E.g., Ben-Ner (1989: 442) regards non-agricultural cooperatives affiliated under the main cooperative umbrella organization in a country, and does not include professions such as law, accounting or medical practices.

3. Market failures in the KMF

Although the KMF is the predominant organizational structure of firms throughout the Western world, Bowles and Gintis (1993) show the KMF is troubled by a range of market failures and that even under highly competitive conditions the LMF may allocate resources more efficiently than the KMF. Market failures arise from the fact that exchange on the labor market is contested. Viewing labor contracts not as 'solved political problems' (Bowles and Gintis 1993b: 86) but through the lens of contested exchange gives rise to a number of market failures. While the claims resulting from an exchange in a (Walrasian) ideal-type market is costless to parties engaged in it, the ex post terms of exchange in the labor market are endogenously determined by monitoring technologies and sanctioning mechanisms that are imposed by the employer. To induce effort in employees, labor markets for instance depend on the contingent renewal of contracts, renewal being a function of effort exerted in the earlier period. Theoretically, the LMF faces different incentive structures, better able to align labor time and labor effort, possibly overcoming many of the market failures present in the KMF. In this section we give an overview of market failures in the KMF and show how the LMF may overcome these, concluding with a short overview of empirical studies into productivity differences between both organizational forms.

In inducing effort, the capitalist entrepreneur is indifferent between expenditure on monitoring or on wages, concerned only with ensuring it is not possible to achieve further net gains in worker productivity through additional expenses on either instrument. Employees on the other hand will strongly prefer the use of the wage incentive, implying monitoring is socially costly, while higher wages entail redistribution of income between employer and employee. This market failure in which the KMF uses 'too many monitoring resources and not enough wage incentives' (ibid.: 574) is overcome in the LMF through the wage incentive effect. All other things equal, to elicit the same work effort, the LMF will make more use of the wage incentive and less of the socially costly monitoring incentive.

Related to this market failure, monitoring technologies available to the LMF can be more effective compared to those in the KMF. While the KMF will usually resort to costly management control and all kinds of (electronic) monitoring devices, the LMF can rely more on mutual monitoring. Due to this mutual monitoring effect, the LMF benefits from an almost costless system of more 'horizontal' monitoring, internalizing the positive externalities from individual decisions to cooperate in interdependent tasks (Kruse 1992, 25), reinforced by peer pressure as a more effective type of co-monitoring (Kandal and Lazear 1992). Horizontal

monitoring may often be more effective than 'vertical' monitoring in hierarchical organizations, possibly overcoming principal-agent type of incentive problems.

Another market failure arises when the KMF alienates workers from their job. The reasoning here is that lower worker motivation stems from the exclusion from decision making and ownership of the fruits of one's labor. The participation effect in a LMF relates to a notion from Klein (1987: 320) that control rights for employees may affect company performance. Less alienation is experienced either because simply being an owner increases commitment and satisfaction, or because control rights increase worker commitment and thereby company performance. Likewise, Pierce et al. (1991: 134) relate the employee ownership of a firm to motivation, which increases due to 'the impact of ownership on instrumentality and expectancy perceptions, valence, cooperative behavior, work group norms, and peer pressure (…), through experienced meaningfulness of work and experienced responsibility for work outcomes'. A related extrinsic productivity argument in the LMF concerns the residual claimancy effect, by which effort increases as workers are aware that higher effort translates into higher profits which in turn are shared amongst employees in the LMF. Therefore, control and return rights in a LMF may increase worker commitment both through intrinsic and extrinsic mechanisms.

Bowles and Gintis (1993) give two more market failures that persist in the KMF. They show there exist Pareto-improving combinations of management pay and risk-taking, not feasible given the manager's degree of risk aversion if the residual claimant owner hires a manager more risk averse than himself. Furthermore, in their analysis of the principal-agent relationship between the lender and a borrower as a residual claimant, there exist Pareto-improving combinations of interest rates and risk-taking that are not within reach of the KMF.

Other market failures related to the inability to specify complete labor contracts relate to the hold-up problem. While the firm and the worker may be willing to invest in firm-specific assets before negotiating wages, the risk of being held up however may discourage the investor from making these investments, leading to underinvestment in for instance worker skills (Grout 1984; Tirole 1986). Kruse (1992) argues the LMF may be able to overcome some of these hold-up problems rampant in the KMF. Turnover may be lower in the LMF through identification with the firm, or valuation of the stronger link between compensation and work effort, hence making investment in firm-specific assets more likely. This latter job security argument is also evoked in a different argument, claiming that while outsider-shareholders, when maximizing their income will be eager to sell their shares at above-market prices in case of a takeover, employee-shareholders may have a more long-run perspective, taking into account their own employment, especially when they consider the takeover as hostile. Finally, efficiency may also

improve if employees in the LMF are more willing to share information, increasing operational productivity and easing innovation. Technical change may furthermore be welcomed amongst employees in a LMF, as technological change will be a major driver of labor income in the LMF compared to the KMF in which it may pose a threat to existing jobs.

A large body of literature has empirically tested the hypothesized advantages of the LMF over the KMF, most recently Blasi et al. (2013: Ch. 5) for the USA. Certain studies focus on the effects of different combinations of control or return rights within KMFs as in Table 6-1, seeking to find out whether these configurations influence firm performance. Conte and Svejnar (1988) show a large and positive productivity effect exists in participation in decision-making, with moderate levels of indirect worker ownership positively affecting productivity. Bayo Moriones et al. (2003) find no significant performance differences between the LMF and KMF in Spanish manufacturing, yet show introducing participation rights generates positive outcomes both for LMF and KMF. Fakhfakh et al. (2012) show French labor managed firms to be as or even more productive than their capitalist counterparts, using inputs more efficiently. If KMFs were to transform to a LMF, using the latter's industry-specific technologies production would be likely to increase. However, even if most studies would report favorable outcomes for the LMF compared to KMF, they still face the problem relating to the few observations for LMFs relative to the ubiquity of KMFs in the same sectors. Before one can measure the performance of LMFs relative to KMFs, it is therefore necessary to investigate why among the many new firms started each year so few LMFs are launched.

4. What inhibits the emergence of LMFs?

If employees in the LMF use more effective monitoring technologies, are more involved in their firm, either as co-owner of the firm, or being aware that higher effort will translate into higher profits to be shared in the firm and LMFs spend less on monitoring and more on wages, then we would expect LMFs to thrive in a competitive environment. The very low incidence of LMF in Western economies however have led authors to doubt the blessings of the LMF. A large literature has offered a multiplicity of accounts of why LMFs fail. Dow (2001) categorizes these explanations along five major lines: (1) asset ownership, claiming workers have weak incentives to maintain rented assets in their LMFs, (2) work incentives, claiming as effort in a team is largely unobservable vertical monitoring will be more effective, (3) wealth and credit rationing, claiming workers tend to be poor and face adverse selection problems on the market for credit, (4) risk aversion, claiming workers are generally more risk averse than investors, and

finally (5) collective choice, arguing workers in a democratic firm will have problems reaching collective decisions.

With the exception of the wealth and credit rationing argument, all of the above arguments follow a "Panglossian" logic, asserting that 'that what is, must be optimal' (George 1997). As Schwartz (2012) argues, explanations of the absence of the LMF revolving around these arguments claim that even given market failures in the KMF, LMFs perform even worse. The first question to be answered is rather why so few LMFs are started to begin with. Given 553,000 new firms in the United States in 2009—of which a large fraction will undoubtedly fail—only a handful at most are started as worker cooperatives, so what explains why so few LMFs are formed?

Among the arguments defying such a Panglossian logic, Bowles and Gintis (1993) discuss the largely absent LMF by posing three constraints on its operation. A democratic capacity constraint inhibits new LMFs from forming, claiming workers are not attuned to democratic rule of the firm and face high costs on learning how to govern the firm democratically, preventing a workforce to become experienced with democratic management. In the same vein, George (1997) argues that economic theory departs from an exogenous preference structure, while preferences about the organization of the work place may be endogenous, shaped by experiences. Putterman (1993: 130) similarly speaks of endogeneity of preferences, claiming 'the desire [for control rights] may be non-existent or weak if workers are socialized into the expectation of subordination on the job and are conditioned to viewing work as an acceptable sacrifice making possible increased consumption during leisure time'. In addition, Bowles and Gintis pose an economic environment constraint, where path dependency in an economy with many (few) LMFs increases the likelihood of more (fewer) LMFs to start. Once a 'critical mass' of LMFs in an economy is reached, one may expect new ones to more easily form. Finally, akin to Dow's wealth and credit rationing argument, the wealth inequality constraint claims workers are often asset-poor, unable to borrow large sums to purchase firm stock with limited collateral, if any. Furthermore, while the worker in a KMF can diversify his assets and thereby risk, the employee of a LMF concentrates both his returns from work and savings in a single asset. Uncertainty about the returns and prospects for the firm may prevent a risk averse worker from sharing in its ownership.

Schwartz (2012: 266) dismisses the wealth inequality constraint, claiming there is no 'evident reason that they [LFM] are less creditworthy than capital-managed firms': Past examples have shown incidences of self-financed takeovers by workers (e.g. United Airlines), while (union) pension funds may have assets exceeding the value of firms employing these

(union) workers. As pension funds manage deferred wages of workers, trade unions might consider using pension fund money to buy capital shares, and hence decision-making, in companies on behalf of the workers.

While the LMF may outperform the KMF, in its core 'a labor-managed firm is a public good' (ibid.: 267), facing collective action problems inhibiting its emergence and giving rise to free riding behavior. Schwartz (ibid.: 273) describes the collective action problem of starting a LMF as follows:

> 'Forming a labor-managed firm involves individuals pooling their resources and coming to a mutually satisfactory agreement about how to set up and manage a business—an agreement in which each must trust the others, and where enough of them actually follow through to provide the public good. Insofar as economic rationality impinges on their motivation, or their behavior tracks such rationality whatever their motivation, it creates incentives for free riding and opportunistic behavior'.

Due to the public good nature of its organizational structure, each has the 'incentive to contribute less than or none of the share required to generate the optimal amount of the good, on the pattern of an n-person prisoner's dilemma' (ibid.: 283). In his account, in line with Bowles and Gintis' economic environment constraint, this collective action problem is both reinforced and exacerbated by unfamiliarity with LMFs by workers and investors:

> 'Most workers (and most lenders and investors) do not know about cooperative organization, while self-employment or small capitalist business is widely known and moderately well understood. For workers, the idea of cooperatives or other forms of worker ownership typically arises, when it does, only in extreme situations such as the threat of a plant closure. It is therefore to be expected that workers with an entrepreneurial frame of mind or a desire to be their own bosses turn to small business—over half a million such enterprises are started every year—even though the risk of failure is very high. Not only need they not confront collective action problems—at least not on a scale or to the degree that they would in forming a cooperative— but they can operate within a familiar—and therefore attractive—organizational form' (Schwartz 2012, 277)

This final argument we apply in the following section in order to analyze both why so few LMFs are started. We present this argument in an analytic framework which enable us to formulate policy proposals that address these specific collective action problems in the start-up phase of the LMF.

The collective action problem in starting a LMF

We interpret the governance of a LMF as a public good or club good, with higher job security, participation in decision-making and shared residual claimancy as benefits for workers. In the case of pure public goods in which exclusion is by definition not possible, the resulting Cournot-Nash equilibrium in which individual contributions are conditional upon other's contributions is characterized by underprovision. In our case exclusion is however feasible, likening its provision to that of a club good. As the supposed benefits of the LMF accrue only to those workers subscribing to the LMF, public economics literature claims such club goods generally face no market failures compared to some of the collective action problems prevalent in the provision of pure public goods. Indeed, early theories on club goods (especially Buchanan 1965) viewed these as types of cooperatives, which 'coordinated action by members to maximize the welfare of the group' (Sandler and Tschirhart 1997).

In as far as handbooks of public economics literature deal with the process of setting up a club good (see Hindriks and Myles: Ch. 7), they assume a profit maximizing entrepreneur who starts a firm and demand fees (a fixed membership fee or a two-part tariff with additional user fees) of clients to make use of the facilities (e.g., a fitness center). Our question enters where the entrepreneur decides whether to organize such a club along the lines of a LMF, or to start a conventional KMF. Barham et al. (1997) shows that in a decentralized process without the assumption of coordination, i.e. without an entrepreneurial agent, any ad hoc club formation process would give rise to multiple equilibria, taking the form of a so-called coordination game. Such coordination problems may trouble the voluntary participation in setting up a club good: Workers may be able to realize mutual gains by forming a LMF, but only by making mutually consistent choices. Free riding on the contributions of others (Olson 1965) or hold-ups because actors await others to take the lead may give rise to inaction.

Using a payoff matrix, we will specify the constraints on starting a LMF. We assume the coordination game resulting from the voluntary nature of starting the LMF can only be overcome by a single or small subset of entrepreneurial workers, taking it on themselves to form a LMF by coming to a mutually satisfactory agreement about how to set up and manage a business.[40] For any prospective entrepreneur however, we must first ask the question why this entrepreneur would not set up a KMF instead and capture the full returns to entrepreneurship instead of sharing them with fellow workers (see the first stage in Figure 6-1). If the

---

[40] As we shall show, the LMF's entrepreneur must be willing to tolerate free riders on his entrepreneurial efforts.

entrepreneur has reasons to prefer the LMF above a KMF, in a subsequent second stage, the prospective members must prefer to join the LMF above an outside wage offer.

Table 6-2: Payoff matrix

		L	
		C	D
E	C	a_1, a_2	b, c
	D	d_1, d_2	e, f

		L	
		C	D
E	C	$\dfrac{\pi^L - F^L}{L+1}, \dfrac{\pi^L - F^L}{L+1}$	$\dfrac{\pi^L}{L+1} - F^L, \dfrac{\pi^L}{L+1}$
	D	$\dfrac{\pi^L}{L+1}, \dfrac{\pi^L}{L+1} - \dfrac{F^L}{L}$	$\pi^K - F^K, W$

E = entrepreneur, L = workers, C = cooperate, D = Defect, π = profits, F = start-up costs, W = market wage

We make use of a highly stylized payoff matrix as used in game theory in which players can either cooperate (C) or defect (D), with either a KMF entrepreneur/owner who employs L workers, or an entrepreneur who forms a LMF with L workers joining as members (see Table 6-2). So among the $L + 1$ persons there is at least one entrepreneurial type who is the natural candidate to take the lead, either to start a KMF or a LMF. We abstract from capital, or assume that in the short run capital is fixed. The payoff matrix is given in Table 6-2.

There is a cost F to start or set up a firm, differentiated by type of firm, which can be either a LMF (superscript L) or a conventional KMF (superscript K). These start or set-up cost can be interpreted broadly, not primarily in monetary expenditures, but mostly in (over)time not being compensated in terms of money or the monetary equivalent of worries and psychic cost to set-up a new business. Profits are given by π, again differentiated for the LMF and KMF. Profits in a LMF (π^L) are shared equally among members, where it must be taken into account that instead of wages as in the KMF, the income of members of the LMF is their equal share in the profits. Of course, the decision of E is influenced by the choice of L to defect or cooperate and vice versa. A Nash equilibrium is obtained if both decisions are mutually compatible, e.g. if E cooperates, then L defects and if L defects, then E cooperates. A dominant strategy arises when one choice is better than another for one player, no matter the choice made by the other. Figure 6-1 translates the payoff matrix of Table 6-2 into the extensive form representation of the game. The extensive game form allows to derive the conditions under which an equilibrium outcome is likely to evolve.
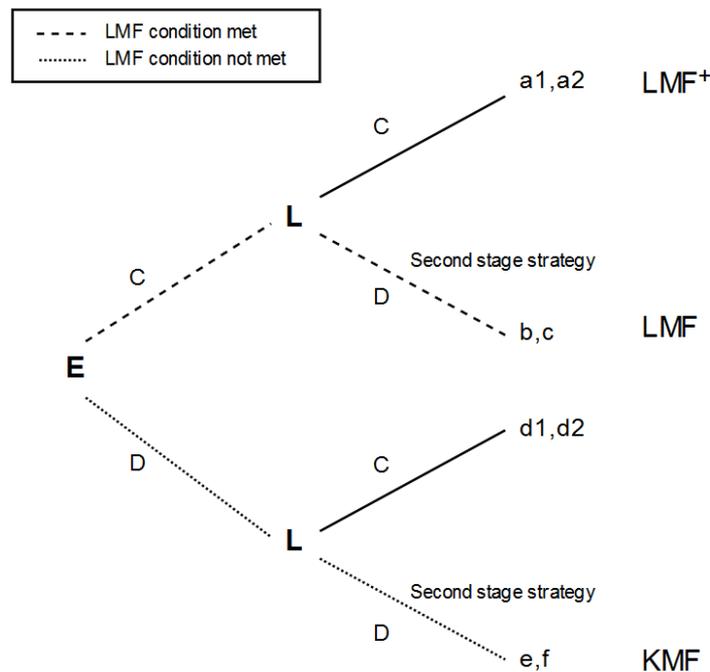
Figure 6-1: Extensive form, Entrepreneur (E) moves first.

Our point of departure is the collective action problem highlighted by Schwartz (2012), being the failure of workers deciding collectively to start-up a new LMF, or turn the existing KMF into a LMF. We will show that when there is an entrepreneurial agent prepared to launch a LMF, the best strategy for the workers is to defect in the start-up phase. Backward induction allows us to find the subgame perfect Nash equilibrium. As it is natural to assume E to be the first mover, we first ask what L would do conditional on cooperation or defection by E. Anticipating L's conditional choices, E will determine its best strategy. Throughout we assume the participation of an entrepreneurial agent to be essential for the emergence of the LMF, implying with defection of E formation of a LMF would suffer from a coordination game, as explained above. We therefore rule out the possibility of emergence of a LMF in which L cooperates while E defects.

Figure 6-1 depicts where E is the first mover. By backward induction E will choose its optimal strategy, depending on the choices of L in the second stage. If E chooses to cooperate, L will choose to defect because c is always higher than a_2. If E defects then the emergence of a LMF is ruled out, so L is forced to defect. Therefore, if the entrepreneur is the first mover, to defect is a dominant strategy for the workers. Backward induction now implies that E anticipates that L will defect and will choose to start a LMF only if $b \geq e$ is met, which we will label as the LMF constraint (LMFC):

$$b \geq e: \frac{\pi^L}{L+1} - F^L \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)[\pi^K + (F^L - F^K)] \qquad \text{(LMFC)}$$

From an efficiency point of view, LMFC turns out to be unduly stringent on the proliferation of LMFs (see Figure 6-2 below). Summarizing, if E cooperates, L will defect since for L to defect is a dominant strategy and if L defects, E will cooperate only if the LMF constraint is met. So (E cooperates, L defects) is a Nash equilibrium subject only to the LMF constraint. We now turn to determine whether the emergence of LFMs are (in)efficient.

The added value $\bar{V}$ per capita in the LMF and KMF can be defined as:

$$\bar{V}^K \equiv \frac{\pi^K - F^K + WL}{(L+1)}$$

$$\bar{V}^L \equiv \frac{\pi^L - F^L}{(L+1)}$$

The efficiency condition for the LMF requires $\bar{V}^L \geq \bar{V}^K$, or in terms of profits of the LMF:

$$\pi^L \geq \pi^K + (F^L - F^K) + WL \qquad \text{(EC)}$$

In other words, the efficiency condition (EC) states that profits of the LMF must at least be as high as the KMF's profits, the difference in start-up costs and the wage bill of the KMF.

Figure 6-2 graphically presents the LMF constraint (LMFC), with a slope of $L+1$, and the efficiency condition (EC), with a slope of 1. The shaded area above EC and below LMFC shows possibly efficient LMF exist that nevertheless due to the LMF constraint not being met are not formed. The intersection point $(W - (F^L - F^K), (L+1)W)$ can be derived by equating the right hand side of EC to LMFC. To the left of the vertical line through the intersection point, the LMF constraint is too lax since firms that do not pass EC might still pass the LMF entrepreneurial constraint.

Assuming at least normal profits in KMF, so $\pi^K \geq W + F^K$, the area left of the vertical line can be disregarded. The market failure of the non-emergence of LMF despite being more efficient is represented by the shaded area in between the lines EC and LMFC and the vertical line at $\pi^K = W + F^K$. To give a numerical example, for $W = 10; L = 5; F^K = 10; F^L = 15; \pi^K = 26; \pi^L = 153$, EC is passed with flying colours (or in terms of added value per capita, $\bar{V}^K = 11$ and $\bar{V}^L = 23$), but the LMF constraint is still not met (the payoff for the LMF entrepreneur $\frac{\pi^L}{(L+1)} - F^L = 10.5$, while for the KMF entrepreneur it is $\pi^K - F^K = 16$).
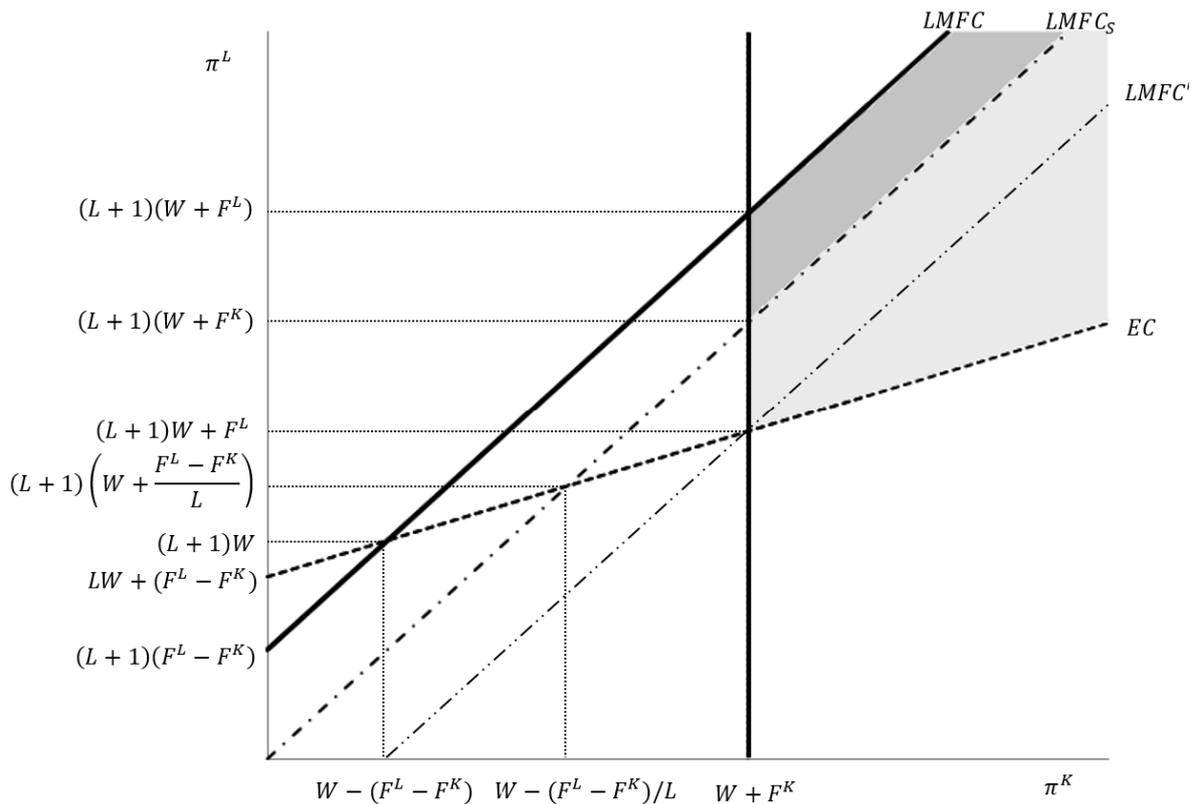
Figure 6-2: The LMFC and EC

Before we go on to consider the role of start subsidies in alleviating this collective action problem, note that this simple framework can easily accommodate some salient empirical findings concerning LMFs. Firstly, many real world LMFs predominantly emerged from employee buyouts of a KMF in financial dire straits (notable examples include Weirton Steel in the United States and Tower Colliery in Scotland). In terms of LMFC, this causes π^K to be low or even negative. If for simplicity we assume a single time period, π^K also represent the net present value of a KMF. If this term becomes zero, LMFC results in:

$$\frac{\pi^L}{L+1} \geq F^L - F^K$$

In other words, earnings of the entrepreneur in a LMF must now only be high enough to compensate for the extra start-up costs (and of course be higher than W), with F^L the start-up cost to transform the firm into a LMF and F^K the start-up cost of a new KMF. Graphically, the new situation is a point on the y-axis above the point of intersection of LMFC and the y-axis. If the net revenues of the new LMF are insufficient to make up for the difference in start-up cost and to pay members the going 'wage' W, it does not meet the EC condition and bankruptcy is to be preferred.

Secondly, some historical examples of LMFs are shown to be initiated by spiritually inspired entrepreneurs, of which the founder of the Mondragon cooperatives, priest José María Arizmendiarrieta, serves as the paradigmatic example. In terms of our framework, although LMFC is binding in a non-spiritual sense, it may not be relevant for the spiritual leader (to include this effect requires the use of utility functions which take into account warm glow considerations, see e.g. Andreoni 1990). These considerations could be thought to lower the experienced F^L which cause a downward shift of LMFC, increasing the likelihood a LMF is formed.

Finally, conditions are relaxed as soon E is comprised of two or more individuals (so in the cooperative row for E, F^L is shared by the number of E), which is in line with the observation that many LMFs are initiated by a couple or trio as a subset of the new partnership. In terms of LMFC, varying E and assuming the total number remains fixed to $L + 1$:

$$\frac{\pi^L}{L+1} - \frac{F^L}{E} \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)\left[\pi^K + \left(\frac{F^L}{E} - F^K\right)\right] \qquad \text{(LMFC')}$$

Thus the slope of LMFC', the dashed line in Figure 6-2, is equal to LMFC, but the intercept might become negative (if $F^K > F^L/E$), which increases the probability of the emergence of inefficient LMFs. Intuitively, the cooperating founders are sharing the burden F^L, but the new LMF is not generating enough benefits to pay all members the going wage W and compensate for the higher start-up costs. Interestingly, it is easy to derive the required number for E such that line LMFC' intersects the EC line exactly at the point $(W + F^K, (L + 1)W + F^L)$ by equating the right hand side of EC and LMFC', impose $\pi^K = W + F^K$ and solve for E, which gives $E = L + 1$. So only when all workers are prepared to shoulder the start-up cost of the LMF, giving rise to the fully cooperative LMF⁺ in Figure 6-1, then just at the long run equilibrium where $\pi^K = W + F^K$, the entrepreneurial LMF constraint is not more binding than the efficiency constraint. However, the extensive game form where the entrepreneur is the first mover has shown that to defect is a dominant strategy for L, so the outcome that all prospective members of the LMF will join right from the beginning is highly unlikely. Therefore, we turn to the instrument of start-up subsidies to address the problem of non-emerging LMFs despite being more efficient than KMFs.

5. Start-up subsidies

We proceed by considering the role of a start-up subsidy for the LMF. Obviously, granting subsidies without any conditions with respect to real participation in the start-up of the LMF

will even strengthen free-riding incentives, because one's share in the subsidy can be cashed in while free-riding. We therefore assume that the subsidy is shared only among those who are involved in setting up the LMF, which may either be only E, or E and L together, again excluding the emergence of LMFs without the involvement of E. As with the start-up cost, the term 'subsidy' has to be interpreted broadly, so not only (over)time being compensated in terms of money, but also the free or subsidized provision of services in the form of expertise, provision of standardized forms to start a LMF, legal help and council, in sum anything that might help or ease the start-up of a LMF.[41] We first analyze the case where the subsidy S is a fixed sum.

Table 6-3: Payoff matrix with start subsidy S

		L	
		C	D
E	C	a_1, a_2	b, c
	D	d_1, d_2	e, f

		L	
		C	D
E	C	$\dfrac{\pi^L - F^L + S}{L+1}, \dfrac{\pi^L - F^L + S}{L+1}$	$\dfrac{\pi^L}{L+1} - F^L + S, \dfrac{\pi^L}{L+1}$
	D	$\dfrac{\pi^L}{L+1}, \dfrac{\pi^L}{L+1} - \dfrac{(F^L - S)}{L}$	$\pi^K - F^K, W$

As Table 6-3 shows, the subsidy changes the payoffs. The interesting question is to what extent the subsidy relaxes the LMF constraint and how high the subsidy should be (or, if S is variable, what form it should take). For notational convenience, we use the subscript s in the conditions for the subsidized case. As a reminder, the outcome of the unsubsidized case was that the Nash equilibrium of L defect and E cooperates obtains if the LMF constraint is met, otherwise the status quo of the KMF is maintained.

To achieve a level playing field, suppose the subsidy is pitched at the difference in start-up cost of a LMF and a KMF, so $S = F^L - F^K$. Using the payoff matrix of Table 6-3, to defect is still the dominant strategy for L (if E cooperates, L defects because $c < a_2$ and if E defects, L defects because we ruled out the emergence of a LMF without entrepreneurial input). Again, anticipating defection by L, E will start the LMF if the subsidized LMF constraint is met:

$$b \geq e: \frac{\pi^L}{L+1} - F^L + S \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)[\pi^K + (F^L - F^K) - S] \quad \text{(LMFCs)}$$

Substitution of $S = F^L - F^K$ into the right hand side gives $\pi^L \geq (L+1)\pi^K$, which compared to the original LMF constraint $\pi^L \geq (L+1)[\pi^K + (F^L - F^K)]$ implies a relaxation on required LMF profits of $(L+1)$ times the subsidy S. Graphically, the LMFC line shifts down and now runs through the origin, again with a slope of $L+1$. By equating the right hand side of LMFCs

---

[41] For instance, one can think of that the subsidy is entirely in kind, in which case the Chamber of Commerce for LMFs will take care of the organizational efforts in the start-up phase.

and EC, the intersection point occurs for $\pi^K = W + (F^L - F^K)/L$, which is in between $\pi^K = W$ and $\pi^K = W + F^K$. So at the long run equilibrium where $\pi^K = W + F^K$, the subsidized LMF constraint is still more binding than EC. Naturally, an even higher subsidy further relaxes the LMF constraint (shifting it further downwards), but at the same time increases the danger of emergence of inefficient LMFs. This naturally leads to the question what the level of S must be, such that the subsidized LMF constraint and EC intersect exactly at the long run equilibrium where $\pi^K = W + F^K$. Inserting $\pi^K = W + F^K$ into $LMFC_S$ and EC and solving for S gives the firm-size subsidy $S^L = LF^L/(L + 1)$, so the larger the LMF firm, the closer the required subsidy is to the full start-up costs F^L. Note that for $S \geq F^L$, the full cooperative LMF$^+$ (so both E and L cooperate) is possible if EC is met. Intuitively, the subsidy is now so high, and given that the subsidy is targeted to those who join in the start-up stage, also L (because $a_2 \geq c$) wants to join the LMF right from the start-up phase. The disadvantage is the emergence of inefficient LMFs, which is more likely to happen if in the relevant range around $\pi^K = W + F^K$ the $LMFC_S$ line is below the EC line.

Finally, is there a subsidy that incentivize the entrepreneur to start a LMF irrespective if L cooperate or defect when a LMF is at least as efficient as the KMF? This requires devising a subsidy that sets the efficiency condition EC equal to LMFCs:

$$\pi^K + (F^L - F^K) + WL = (L + 1)[\pi^K - (F^K - F^L) - S^*]$$

Solving for S^* gives:

$$S^* = \frac{L}{L + 1}[\pi^K - W + F^L - F^K]$$

The information required to provide this subsidy is not only the firm size and the start-up costs of a LMF as in the firm-size subsidy S^L above, but also the profits in a KMF, the wages paid in a KMF and the start-up costs of a KMF. Using more information, if available, allows for a more efficient subsidy. Note that in the competitive long run equilibrium, with $\pi^K = W + F^K$, $S^* = S^L$.[42]

As Figure 6-2 shows, the provision of subsidies helps the formation of LMFs that are more efficient than KMF, e.g. for firms where $\pi^K = W + F^K$ the subsidy eliminates the collective action problem and causes a new LMF to emerge. However, for firms where $\pi^K < W + F^K$ the subsidy can lead to the emergence of inefficient LMFs, that it, where due to the subsidy the LMF constraint is passed, but not the EC constraint. Using our numerical example,

---

[42] As can be seen from the expression for S^*, even if there is no difference in start-up costs, a subsidy is required to compensate the entrepreneur for any earnings he could make in excess of W.

for $S^* = S^L = 12.5$ and $W = 10; L = 5; F^K = 10; F^L = 15; \pi^K = 15,$ for the range $\pi^L = [45; 75),$ the subsidized LMF constraint $LMFC_s$ is met, but not EC.

Justifying start subsidies for LMFs

If market failures prevail in the KMF and are serious enough, while the LMF has properties that may be conducive to attenuate or solve them, there is an argument for public intervention. We have elaborated on a major problem of LMFs, namely that it is plagued by a collective action problem in the start-up phase, that can be solved by providing a start-up subsidy. As the burden of proof is on the side of LMF proponents, we present a more general argument to support our claim that government intervention, if any, should concentrate towards subsidies to help start up new LMFs. Following Meade (1972), we relate these arguments to the observation that LMFs will respond differently to exogenous (demand) shocks than KMFs.

A major difference between a LMF and a KMF relate to shocks in demand for their output. While higher demand results in expansion of employment in KMFs, it reduces employment in the LMF (the so-called Illyrian firm, that is, the firm which is assumed to maximize income per worker. For an empirical assessment, see Burdín and Dean 2012), coupled with higher average earnings (see Meade 1972: 407-8). A KMF located in an industry with increasing demand and thus a higher product price will attract more workers at the prevailing wage level W up until the point that the marginal product of labor is again equal to W.[43] A LMF, situated in the same industry, will not have an incentive to expand employment because the rise in the marginal product of labor will be less than the rise in average earnings of its members. A KMF system can thus rely more on expansion and contraction within existing firms, while a LMF system must rely more on the free entry of new firms. These same mechanisms are at work if competition is monopolistic. Meade (ibid.: 411) notes the importance of free entry, arguing that 'in the Co-operative system this situation is ultimately restored only by the free entry of new firms into any industry which has become exceptionally lucrative as a result of a rise in its selling prices. It is thus clear that the competitive pressures of free entry play a much more important role in a Co-operative than they do in an Entrepreneurial system'.

Second, in a LMF dominated economy demand-driven policies measures are ineffective. Demand-driven policies to curb growing unemployment in an economy with many

---

[43] To give an example, suppose capital costs C are 50, $P = W = 1$, $L = 50$ and $Q = 100$, with $\pi^K = P \cdot Q(L) - WL - C$, maximizing profits requires $MP_L = P \cdot \partial Q/\partial L = W$ so in the initial situation $\partial Q/\partial L = 1$. If P rises to 1.25, then $\partial Q/\partial L$ must go down to 0.8, so L will increase. For the LMF, in the initial situation average earnings are $(PQ - C)/L = 1$ and rises to 1.5 due to the price increase. For the LMF, L will be reduced until the marginal product of labor again equates the higher average earnings.

LMFs would require decreasing total demand (see above, when demand increases, the LMF contracts employment and vice versa) or increasing taxes on LMFs to increase fixed overhead costs, which gives LMF an incentive to increase employment. As such policies would be generally undesirable, employment cannot be increased by any other policies but setting up new firms. Meade (1972: 415) here notes unemployment's 'cure must be found in a longer-term structural policy aimed at promoting the institution of new firms by the unemployed in order to help them in their desire to enjoy the average earnings of an employed worker rather than the pittance of unemployment benefit'.

6. Conclusion

While standard neoclassical economic theory assert indifference between capital hiring labor and labor hiring capital, the majority of firms in Western economies are organized along a structure with control and return rights held by equity finance or owners of its physical assets. We show that in an economy characterized by contested exchange, this type of organization faces a number of market failures which firms in which control and return rights reside with labor may be able to overcome. We present a number of standing arguments that explain the absence of LMFs, yet argue that before studying why LMFs may fail in the economy we should ask the question why so few are started to begin with. We follow Schwartz' (2012) argument that the LMF constitutes a public good or club good (if excludable to its members) and faces severe collective action problems in its start-up phase, inhibiting its emergence. By exploring this notion in a game theoretical framework, we are able to explain some salient features of existing LMFs and contribute to understanding of why so few LMFs are started.

Arguing from a market failure perspective, public intervention may be warranted. We argue government intervention should aim at the startup phase of LMFs. Government may either actively subsidize LMF in the form of monetary payments to initiators of these cooperatives, or may seek to lower the nonmonetary entry barriers for LMF firms by providing standardized forms, legal counselling and other in-kind services. We show the importance of free entry of firms in an economy with many LMFs and conclude that subsidies may be able to relax constraints and induce cooperation.

To conclude, one may ask why the start-up of a LMF has to be subsidized, but not a KMF in the same sector. This is indeed a legitimate question and the burden of proof here resides on the side of proponents of the subsidy. In particular, they have to show that the market failures inherent in some types of KMF and efficiency and other gains of the LMF are such that these subsidies are justified. Meade (1972: 927) claims that 'it may well be the case that the

merits of participation should be so highly prized as to make the encouragement of such institutions a major objective of governmental policy'. Furthermore, LMF subsidies may only be warranted in some parts or sectors of the economy. We do expect that even with a full-blown subsidy scheme not all new firms will be LMFs. An innovative entrepreneur with a highly profitable business plan would be wise to start a KMF rather than a LMF, since in the former he or she is the only residual claimant of (monopolistic) profits, while in the latter the value of the innovation has to be shared. For many other business, where normal profits are expected, a LMF may be preferred to a KMF if the efficiency constraint can be met.

Chapter 7: **Conclusions**

Recent increases in income inequality have led a number of authors to question the *redistributive thesis*, which predicts higher levels of income inequality will be met with increased redistribution of income, curbing inequality. This dissertation offered a new test of this theory, and set out to understand the great variation maintained across nations regarding their redistributive policies. This conclusion gives an overview of the main findings from the individual chapters, concludes on their joint policy implications and offers directions for future research.

1. Main findings

The *redistributive thesis* suggests increasing income inequality will move a majority of voters—less well off, at least in relative terms—to favor higher taxes and transfers, the proceeds of which are directed downward. The introduction of this dissertation suggested this thesis poses a theoretical problem. It firstly may be the case that democracies are generally responsive to the political demands of the majority, while academic work may be unable to adequately capture these demands. It may however also be the case that while we are able to capture these demands adequately, our accounts of the responsiveness of the democratic process to the majority is too much of an ideal-type. The overall conclusions from this dissertation is that while (stated) redistributive preferences do not seem to result from voters weighing the costs and benefits of increased taxation (Chapter 3), and that insurance motives may exist apart from redistributive motives (Chapter 5), income remains a particularly good predictor of voters' redistributive preferences.

Given the importance of income in predicting redistributive preferences, Chapter 2 was able to assess the validity of the *redistributive thesis* among OECD countries. It found support for the thesis, showing the decisive voter, defined as the earner who sees his or her preferred tax rate being implemented, on average was located at the 50th percentile in the income distribution. Although the median voter theorem thus on average seemed to hold for this group of democratic and economically developed nations, diffuse patterns were found to persist over time, both within and between countries. Institutional differences remain important, as the variation between countries was shown to align with the welfare state typology offered by Esping-Andersen (1990).

The key methodological innovation of this chapter lied in showing that under the assumption of a lognormal distribution of gross income, one can derive tax rates which align the observed gross and net Gini coefficients. These derived tax rates could be compared to those

rates preferred by the median income earner. A second innovation lied in locating the positions of several alternative versions of the decisive voter in a Lorenz curve diagram, among the one hypothetically following the 'one dollar, one vote' rule, visualizing both economic inequality and the underlying political process.

Chapter 3 studied the redistributive preferences of voters under imperfect information about the role of government and the shape of and location within the income distribution. It demonstrated theoretically how such informational imperfections may move voters' preferences away from their pocketbook interests, and showed how beliefs about government and the income distribution may lead to equivalent changes in preferences over taxation. The empirical section assessed whether one's actual or perceived location in the income distribution is a better predictor of redistributive preferences. Given a tendency for overestimation of their income position among respondents, if electoral choices are indeed based on a rational weighing of costs and benefits of increased taxation to fund redistributive expenditures, it must have been one's perceived (and hence known) location rather than one's actual (and unknown in the case of over- or underestimation) location that drove one's preferences.

Findings however showed one's actual, rather than one's perceived income location has most predictive power in explaining attitudes regarding income equalization. Furthermore, and going against theoretical predictions, given one's actual income position, over- or underestimating one's position did not significantly affect one's preferences. The driver of redistributive preferences may thus less be a calculus of costs and benefits of increased taxation, but rather lie in factors more strongly associated with one's actual, rather than with one's perceived income position that drive preferences. Such factors could lie in one's social circle, neighborhood or work environment, or lie in one's social background and socialization, and associated beliefs about luck and effort. This insight echoes earlier work of Piketty (1995), who noted the important role beliefs play in preference formation, which he argues are not arbitrary but rather follow from exposure to different types of information depending on one's economic position. Importantly, this view is at odds with much of the political economic scholarly work up until now that views political preferences as following directly from the interests of voters, largely ignoring the role of beliefs.

Chapter 4 assessed how the observed tax-and-transfer systems weigh up against those justifiable under a specific conception of distributive justice, Equality of Opportunity (EOp). Fiscal policies in this case should only redress those inequalities resulting from circumstances beyond the individual's control, such as one's (parental) background. For the UK, tax rates on the basis of EOp should increase to correct for the effects of parental background as well as the

effects of gender on income attainment. Findings are similar for the Netherlands, where gender along with origin (migrant or non-migrant) also appears to be the circumstance which most influences individuals' attainment of gross income. Compared to the United Kingdom, where there is no clear difference between parental education and parental occupation, in the Netherlands parental education is found to be far more important than parental occupation, and would require tax levels well above those which we observe. Findings for Germany appear largely dependent on the background of respondents, given one's roots in either the former DDR or BRD. Given such roots, parental background requires even higher taxes to achieve EOp for Germany. Over time the required tax rates to reach Equality of Opportunity for Germany somewhat decrease, largely driven by an improvement in the relative incomes of those with roots in the DDR.

Findings however were largely dependent on both the labor supply elasticity with respect to wages and on the definition of relevant circumstances. Higher elasticities imply the disincentive costs of taxation are greater, lowering the scope for measures to ameliorate inequality of opportunity. Deadweight losses thus in certain cases may be greater than the counteracting benefit of more EOp. The chapter showed how the estimated EOp policy parameters can be corrected for covariates variables such as age, which in some cases correlated both with one's income and an individual's circumstance. Finally, the chapter demonstrated the model used in the chapter adequately can capture labor supply decisions, as derived labor supply aligned with observed labor supply data.

While the *redistributive thesis* implies growing inequality moves majorities to favor higher taxes and transfers, the proceeds of which are directed downward, there is no mechanism by which these elected measures correct for those inequalities deriving from circumstances beyond the individual's control. Findings regarding the specific conception of distributive justice in this chapter suggest governments should in many cases do more to correct for inequalities resulting from circumstances beyond the individual's control than majorities would elect under the *redistributive thesis.* The democratic process as envisioned under this thesis, in other words, does move closer to equality of opportunity, yet offers no guarantee of it.

Chapter 5 set out to empirically assess two competing accounts of the effects of globalization on the welfare state. While the compensation hypothesis argued welfare states are robust or may even expand in the face of globalization, as governments compensate those that lose out from globalization, the constraint hypothesis argues globalization would cause downward pressure on government revenues and hence leading to a retrenchment of the welfare state. This study investigated these competing accounts at the individual level, and sought to

find whether perceived job insecurity could explain retrenchment, resilience or expansion of welfare states through the channel of party support and voting.

Using data from 1991 to 2008 on employed working age individuals of voting age and exploiting the panel data structure, the study was able to estimate the effects of changing perceptions of job security on support for specific political parties within individuals, controlling for a range of unobserved individual characteristics that remained constant over time. Findings showed job insecurity alone could not explain party support, and that only in times of high occupational unemployment increased job insecurity translated into higher propensities of left wing party support. While the findings were robust to different specifications, they appeared to be country-specific, as findings using different data for Germany found no effects of job insecurity or employment prospects on mainstream party support. Confirming earlier studies on Germany, individual economic uncertainties in Germany may be channeled outside, rather than within the political mainstream, compared to the findings for British voters.

Chapter 6 finally studied possibilities to influence the gross distribution of income apart from minimum wages or collective bargaining. The chapter was based around the question why, while neoclassical economic theory asserts indifference between capital hiring labor or labor hiring capital, the majority of firms in Western economies are organized along a structure where control and return rights are held by equity finance or owners of its physical assets. While current explanations on the absence of these labor managed firms argue why they may fail in the economy, this chapter suggested we should ask the question why so few are started to begin with. Viewing this absence as the result of severe collective action problems in its start-up phase, inhibiting its emergence, this chapter used a game theoretical framework to contribute to the understanding of why so few of these firms are started. In offering several justifications for public intervention, this chapter proposed government action should be aimed at the start-up phase of these firms, where start-up subsidies may be able to relax the constraints to induce cooperation among entrepreneurs and workers.

2. Policy implications

A number of authors have recently expressed the expectation that income inequality will further increase in the future, yet offer distinct channels that drive this process. Piketty (2014) suggests that if the rate of return on capital exceeds the growth rate, the capital share of income will grow and, given increased concentration of ownership, then so will income and wealth inequality. Others have asserted that technological change will further increase income inequality in the

near future (e.g. Freeman 2015), as its impact will be profound and not neutral with respect to skill level or the routineness of work (Goos et al. 2014).

Given the findings of this dissertation, under the premise of the *redistributive thesis*—be it any process that drives this increase in inequality—this will unambiguously put pressure on governments to increase their redistributive efforts (Chapter 2) and on social insurance schemes to cover the increased career risks facing workers (Chapter 5). The underlying premises required for the *redistributive thesis* to hold are that voters are aware of these processes and vote in their pocketbook interests (Chapter 3), and that given increased pressures on governments, responsive democracies adjust their redistributive efforts accordingly (Chapter 2). The degree to which democracies will be responsive to these pressures remains to be seen, as skewed voter turnout or skewed political influence may countervail such pressures (Chapter 2), as may imperfect information on behalf of voters (Chapter 3).

Findings in Chapter 2 and Chapter 4 are both highly dependent on the wage elasticities of labor supply, and thus on the costs of raising taxes. These costs result from individuals reducing their labor supply in the face of higher income taxation. The lower such aggregate labor supply responses are to increased taxation, the higher are the tax rates sustainable under majority rule (Chapter 2). Similarly, the higher this elasticity is, the less tax-and-transfer systems are able to address inequalities arising from circumstances outside of people's control, necessary to achieve equality of opportunity (Chapter 4). In both chapters, the incurred deadweight losses either decrease the net gains from taxation for the median voter (Chapter 2) or overshadow the gains in equality of opportunity for income attainment (Chapter 4).

In addition to responding to increasing inequality by changing tax-and-transfer systems, given the *redistributive thesis*, public policy may seek to influence these labor supply responses to increased taxation, searching for policies that can alleviate part of the distortions from taxation. As Kleven (2014) and others show, specific uses of tax revenue may partly alleviate such tax distortions, when for instance subsidizing specific goods which are complementary to labor supply, e.g. in the case of child or elderly care.

Furthermore, public policy may seek to intervene in the distribution of gross income, i.e. 'predistributing' income (Hacker 2011), thereby reducing pressure on tax-and-transfer systems. Such 'predistributive' policies have been suggested as an important policy option by the Dutch Scientific Council (Van Bavel 2014). Chapter 6 explores just one of such possible avenues to reduce income differentials before taxation. The proliferation of firms where control and return rights rest with employees may both reduce income differentials and provide certain efficiency advantages over traditional firms where these rights are held by the equity finance or

owners of its physical assets. Efficiency gains follow from the fact that the former type of firms may make more use of wage incentives and use less costly monitoring incentives, while the willingness to share information may increase productivity and ease innovation and technical change, which then serves as a major driver of employees' income, rather than posing a threat to existing jobs.

Education fulfills an especially important role in both classes of policies, as it is both able to reduce (long-run) negative labor supply responses to taxation (Bovenberg and Jacobs 2005), and to reduce income differentials before taxation. It furthermore provides another example of a direction along which equality can possibly increase along with an efficiency gain (Putterman et al. 1998), cf. findings of e.g. Roemer (2009).

3. Limitations and directions for future research

A limitation of the framework offered in this dissertation to measure tax-and-transfer systems is its omission of indirect taxes. Future studies may seek to integrate tax revenue from indirect taxes into the framework offered in Chapter 2. Other improvements may consist of establishing better estimates of the parameters from this chapter, especially by introducing country- and time-specific elasticities of labour supply as data becomes available, or by lifting some of the assumptions, e.g. allowing a non-linear tax-and-transfer schemes. As more and better income data becomes available for more nations, the method allows for a comparison that includes economically less advanced or non-democratic nations. This would enable new assessments of the empirical validity of e.g. Kuznets' (1955) expectation of a concave relationship between per capita income and inequality or Boix's (2003) expectations regarding the links between income inequality and democratization. Further quantitative analyses of findings in Chapter 2 may seek to better understand variation across nations, and include institutional variables beyond the welfare state typology from Esping-Andersen (1990) used in the chapter, seeking for instance to evaluate the effects of different party and electoral systems or (skewed) voting turnout on redistributive outcomes. More work is necessary to study the relationship between tax revenue used for redistributive purposes and tax revenue spent on public goods and goods provided in kind.

More research is also needed into the formation of redistributive preferences, seeking to link theories from different disciplines, including psychology, sociology, political science and economics. Chapter 3 offers a starting point, whereby when using surveys on attitudes one can test the importance of certain deviations from the rational voting model underpinning the *redistributive thesis*. An important focus here could also be respondents' evaluations of the

output side of government activities. While a large body of literature has explored the ways in which the salience of tax rates affect public expenditures, suggesting tax payers face a 'fiscal illusion' by which they do not fully perceive the tax bill (Buchanan 1967), studies to a far less extent have focused on possible information imperfections regarding the output side of government activities. Chapter 3 theorizes on its consequences for redistributive preferences, yet more empirical work is necessary. If the public becomes less informed on public policies (see e.g. Mettler 2011b), the perceived benefits of taxation decrease, which similarly to the 'fiscal illusion' potentially may alter individuals' tradeoff between the costs and benefits of increased taxation.

Finally, beyond studying redistributive politics, studies may seek to better understand 'predistributive' policies, understanding how inequality in market income can be mitigated, which lifts part of the burden from tax-and-transfer systems. Such policy alternatives may be promising, as in certain cases they provide the possibility of both increasing equality along with an efficiency gain, cf. Bowles' (2012) productivity-enhancing redistribution.

References

Abras, A., Cuesta, J.: Equality of opportunities, redistribution and fiscal policies: The case of Liberia. World Bank Policy Research Working Paper Series (2011)

Aitchison, J., Brown, J.A.C.: The Lognormal Distribution: With Special Reference to its Uses in Economics. University Press, Cambridge (1957)

Alesina, A., Baqir, R., Easterly, W.: Redistributive public employment. J. Urban Econ. **48**(2), 219-241 (2000)

Andreoni, J.: Impure altruism and donations to public goods: A theory of warm-glow giving. Econ. J. **100**(401) 464-477 (1990)

Arawatari, R.: Informatization, voter turnout and income inequality. J. Econ. Inequal. **7**(1), 29–54 (2009)

Arneson, R.J.: Equality and equal opportunity for welfare. Phil. Stud. **56**(1), 77-93 (1989)

Aronson, J.R., Johnson, P., Lambert, P.J.: Redistributive effect and unequal income tax treatment. Econ. J. **104**(423), 262–270 (1994)

Arts, W., Gelissen, J.: Three worlds of welfare capitalism or more? A state-of-the-art report. J. of Eur. Soc. Policy. **12**(2), 137-158 (2002)

Artz, G., Kim. Y.: Business Ownership by Workers: Are Worker Cooperatives a Viable Option?. Iowa State University, Dep. of Economics, WP No. 11020 (2009)

Austen-Smith, D.: Redistributing income under proportional representation. J. Polit. Economy **108**(6), 1235-1269 (2000)

Austen-Smith, D., Wallerstein, M.: Redistribution and affirmative action. J. Public Econ. **90**(10), 1789-1823 (2006)

Bardasi, E., Jenkins, S.P., Sutherland, H., Levy, H. and Zantomio, F.: British Household Panel Survey Derived Current and Annual Net Household Income Variables, Waves 1-18, 1991-2009. 9th Edition. University of Essex. Institute for Social and Economic Research. Colchester, Essex: UK Data Archive, April 2012. SN: 3909, http://dx.doi.org/10.5255/UKDA-SN-3909-2 (2012)

Barham, V., Boadway, R., Marchand, M., Pestiea, P.: Volunteer work and club size: Nash equilibrium and optimality. J. Public Econ. **65**(1), 9-22 (1997)

Barr, N.: Economic theory and the welfare state: A survey and interpretation. J. Econ. Lit. **30**(2), 741-803 (1992)

Van Bavel, B.J.P.: Vermogensongelijkheid in Nederland: de vergeten dimensie. In: Kremer, M., Bovens, M., Schrijvers, E., Went, R.: Hoe ongelijk is Nederland? : een verkenning van de ontwikkeling en gevolgen van economische ongelijkheid. Amsterdam University Press, Amsterdam (2014)

Bayo-Moriones, J, Galilea-Salvatierra, P.J., Merino-Díaz de Cerio, J.: Participation, cooperatives and performance: An analysis of spanish manufacturing firms, in T. Kato (Ed.): Advances in the Economic Analysis of Participatory & Labor-Managed Firms **7**, 31-56, Emerald Group Publishing Limited, Bingley, West Yorkshire (2003)

Bench, S.W., Lench, H.C., Liew, J., Miner, K., Flores, S.A.: Gender Gaps in Overestimation of Math Performance. Sex Roles **72**(11-12), 536-546 (2015)

Ben-Ner, A.: Producer Cooperatives: Why do they exist in capitalist economies?. In: Powell, W.E.: The Nonprofit Sector. A Research Handbook. Yale University Press, New Haven (1989)

Ben-Ner, A., Jones, D.C.: Employee participation, ownership, and productivity: A theoretical framework. Ind. Relat**. 34**(4), 532–554 (1995)

Betts, J.R., Roemer, J.E.: Equalizing opportunity through educational finance reform. Public Policy Institute of California, San Francisco (1999)

BHPS: University of Essex. Institute for Social and Economic Research, British Household Panel Survey: Waves 1-18, 1991-2009 [computer file]. 7th Edition. Colchester, Essex: UK Data Archive [distributor], July 2010. SN: 5151, http://dx.doi.org/10.5255/UKDA-SN-5151-1 (2009)

Blasi, J., Freeman, R., Kruse, D.: The Citizen's Share: Putting Ownership Back into Democracy. Yale University Press, New Haven (2013)

Boix, C.: Democracy and Redistribution. Cambridge University Press, Cambridge (2003)

Bonica, A., McCarty, N., Poole, K.T., Rosenthal, H.: Why hasn't democracy slowed rising inequality? J. Econ. Perspect. **27**(3), 103–24 (2013)

Bos, W.: Bos 'Stiekeme solidariteit wordt eerder geslikt dan transparante solidariteit'. Volkskrant, January 10, 2013.

Bovenberg, A.L, Jacobs, B.: Redistribution and education subsidies are Siamese twins. J. Public Econ. **89**(11-12), 2005-2035 (2005)

Bowles, S., Gintis, H.: The democratic firm: an agency-theoretic evaluation. in: Bowles, S., Gintis, H., Gustafsson, B.: Markets and Democracy: Participation, Accountability, and Efficiency. Cambridge New York: Cambridge University Press (1993)

Bowles, S., Gintis, H.: The revenge of Homo Economicus: Contested exchange and the revival of political economy. J. Econ. Perspect. 7(1), 83-102 (1993b)

Bowles, S., Gintis, H.: Productivity-enhancing egalitarian policies. Int. Labour Rev. **134**(4-5), 559-585 (1995)

Bowles, S.: The New Economics of Inequality and Redistribution. Cambridge University Press (2012)

Boyer, G.R.: An Economic History of the English Poor Law, 1750–1850. Cambridge University Press (1990)

Bredemeier, C.: Imperfect information and the Meltzer-Richard hypothesis. Public Choice **159**(3), 561–576 (2013)

Brunori, P., Ferreira, F.H., Peragine, V. Inequality of opportunity, income inequality and economic mobility: some international comparisons. World Bank Policy Research Working Paper, 6304 (2013)

Buchanan, J.M.: An economic theory of clubs. Economica **32**(1), 1-14 (1965)

Buchanan, J.M.: The Fiscal Illusion. In Public Finance in Democratic Process: Fiscal Institutions and Individual Choice. Chapel Hill: University of North Carolina Press (1967)

Burdín, G. Dean, A.: Revisiting the objectives of worker-managed firms: An empirical assessment. Econ. Systems **36**(1), 158-171 (2012)

Burgoon, B., Dekker, F.: Flexible employment, economic insecurity and social policy preferences in Europe. J. of Eur. Soc. Policy **20**(2), 126-141 (2010)

Caminada, C.L.J., Goudswaard, K.P., Been, J., Graaf-Zijl, M.: Een kwart eeuw inkomensongelijkheid in Nederland. Economisch Statistische Berichten **99**(4684), 276-279 (2014)

Cappelen, A. W., Sørensen, E. Ø., Tungodden, B.: Responsibility for what? Fairness and individual responsibility. Europ. Econ. Rev. **54**(3), 429-441 (2010)

Cappelen, A. W., Tungodden, B.: Tax Policy and Fair inequality. Discussion Paper. Norwegian School of Economics. NHH (2012)

CBS: Statline. Retrieved from statline.cbs.nl (2016)

CECOP: The Resilience of the Cooperative Model. CECOP-CICOPA Europe (2012)

Chamberlain, G.: Analysis of covariance with qualitative data, Rev. Econ. Stud. **47**(1), 225-238 (1980)

Chambers, J.R., Swan, L.K., Heesacker, M.: Better off than we know: Distorted perceptions of incomes and income inequality in America. Psychol. Sci. **25**(2), 613-618 (2014)

Chevalier, A., Harmon, C., O'Sullivan, V., Walker, I.: The impact of parental income and education on the schooling of their children. IZA Journal of Labor Economics **2**(1), 1-22 (2013)

Chotikapanich, D., Valenzuela, R., Rao, D.: Global and regional inequality in the distribution of income: estimation with limited and incomplete data. Empir. Econ. **22**(4), 533–546 (1997)

Cizmecioglu, F., Doherty, A., Paterson, W.F., Young, D., Donaldson, M.D.C.: Measured versus reported parental height. Arch. Dis. Child. **90**(9), 941-942 (2005)

Cohen, G.A. On the currency of egalitarian justice. Ethics **99**(4), 906-944 (1989)

Conte, M.A., Svejnar, J.: Productivity effects of worker participation in management, profit-sharing, worker ownership of assets and unionization in U.S. firms. Int. J. Ind. Organ. **6**(1), 139-151 (1988)

Cooperatives UK: Homegrown. The UK Co-operative Economy 2013. Manchester (2013)

Crowne, D.P., Marlowe, D.: A new scale of social desirability independent of psychopathology. J. Consult. Psychol. **24**(4), 349-354 (1960)

Cruces, G., Perez-Truglia, R., Tetaz, M.: Biased perceptions of income distribution and preferences for redistribution: Evidence from a survey experiment. J. Public Econ. **98**, 100-112 (2013)

Cusack, T., Iversen, T., Rehm, P.: Risks at work: The demand and supply sides of government redistribution. Oxford Rev. Econ. Pol. **22**(3), 365-389 (2006)

Damgaard, C., Weiner, J.: Describing inequality in plant size or fecundity, Ecology **81**(4), 1139–1142 (2000)

Davis-Kean, P.E.: The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. J. Fam. Psychol. **19**(2), 294-304 (2005)

Dawtry, R. J., Sutton, R. M., Sibley, C.G.: Why wealthier people think people are wealthier, and why it matters from social sampling to attitudes to redistribution. Psychol. Sci. **26**(9), 1389-1400 (2015)

Dikhanov, Y., Ward, M.: Evolution of the global distribution of income in 1970–99, Proceedings of the Global Poverty Workshop Initiative for Policy Dialogue, New York (2002)

Donnely, M.J., Pop-Eleches, G.: The questionable validity of income measures in the World Values Survey. Retrieved from: http://www.princeton.edu/politics/about/file-repository/public/ DonnellyPopElechesMarch16.pdf (2012)

Dow, G., Putterman, L.: Why capital (usually) hires labor: An assessment of proposed explanations, Discussion Papers dp97-03, Department of Economics, Simon Fraser University (1996)

Dow, G.K.: Allocating control over firms: Stock markets versus membership markets. Rev. Ind. Organ. **18**(2), 201-218 (2001)

Dow, G.K.: Democracy versus Appropriability: can labor-managed firms flourish in a capitalist world? in: Bowles, S., Gintis, H., Gustafsson, B. (Eds.): Markets and Democracy: Participation, Accountability, and Efficiency. Cambridge University Press, Cambridge (1993)

Downs, A.: An Economic Theory of Democracy. Harper, New York (1957)

Dreher, A.: Does globalization affect growth? Evidence from a new index of globalization. Appl. Econ. **38**(10), 1091-1110 (2006)

Drèze, J.H.: Labour Management, Contracts, and Capital Markets: A General Equilibrium Approach. Blackwell Publishing, Oxford (1993)

Dworkin, R.: What is equality? Part 1: Equality of welfare. Philos. Public Aff. **10**(3), 185-246 (1981a)

Dworkin, R.: What is equality? Part 2: Equality of resources. Philos. Public Aff. **10**(4), 283-345 (1981b)

Easterly, W.: Globalization, poverty, and all that: Factor endowment versus productivity views, in A. Harrison (Ed.) Globalization and Poverty, 109-142. University of Chicago Press, Chicago (2007)

Esping-Andersen, G.: The Three Worlds of Welfare Capitalism. Polity Press, Cambridge (1990)

Evers, M., de Mooij, R., van Vuuren, D.: The wage elasticity of labour supply: A synthesis of empirical estimates. De Economist **156**(1), 25–43 (2008)

Fakhfakh F., Perotin V., Gago, M.: Productivity, capital, and labor in labor-managed and conventional firms: An investigation on French data. ILR Review **65**(4), 847-879 (2012)

Faricy, C., and Ellis, C.: Public attitudes toward social spending in the United States: The differences between direct spending and tax expenditures. Polit. Behav. **36**(1), 53-76 (2014)

Feenstra, R.C., Hanson, G.H.: The impact of outsourcing and high-technology capital on wages: Estimates for the United States, 1979-1990. Quart. J. Econ. **114**(3), 907-940 (1999)

Ferreira, F.H., Peragine, V.: Equality of Opportunity: Theory and evidence. World Bank Group Policy Research Working Paper (2015)

Fleurbaey, M.: Equal opportunity or equal social outcome? Econ. Philos. **11**(1), 25-55 (1995)

Fong, C.: Social preferences, self-interest, and the demand for redistribution. J. Public Econ. **82**(2), 225-246 (2001)

Freeman, R.B.: Who owns the robots rules the world. IZA World of Labor **5**, 1-10 (2015)

Galesic, M., Olsson, H., Rieskamp, J.: Social sampling explains apparent biases in judgments of social environments. Psychol. Sci. **23**(12), 1515-1523 (2012)

Geishecker, I., Siedler, T.: Job loss fears and (extreme) party identification: First evidence from panel data. Center for European Governance and Economic Development Research Discussion Paper 129 (2011)

George, D.A.R.: Self-management and ideology. Rev. Polit. Economy **9**(1), 51-62 (1997)

Gimpelson, V., Treisman, D.: Misperceiving inequality. NBER Working Paper No. 21174, NBER, National Bureau of Economic Research (2015)

Goos, M., Manning, A., Salomons, A.: Explaining job polarization: Routine-biased technological change and offshoring. Amer. Econ. Rev. **104**(8), 2509-2526 (2014)

Greene, W.: Econometric Analysis. Prentice Hall, Boston (2012)

Groot, L.F.M., van der Linde, D.E.: Income inequality, redistribution and the position of the decisive voter. J. Econ. Inequal. **14**(3), 269-87 (2016)

Grout, P.: Investment and wages in the absence of binding contracts: a Nash bargaining approach. Econometrica **52**(2), 449–60 (1984)

Hacker, J.: The institutional foundations of middle-class democracy. Policy Network, **6**, (2011)

Hansen, J.W.: Uncertainty and the size of government. Econ. Letters **88**(2), 236-242 (2005)

Harms, P., Zink, S.: Limits to redistribution in a democracy: a survey. Eur. J. Polit. Econ. **19**(4), 651–668 (2003)

Hellwig, T.: Balancing demands: The world economy and the composition of policy preferences. J. Polit. **76**(1), 1-14 (2013)

Hindriks, J., Myles, G.D: Intermediate Public Economics (2nd ed.). MIT Press, Mass. (2013)

ILO: ILOSTAT Database. http://www.ilo.org/ilostat/ (2016)

Iversen, T., Soskice, D.: An asset theory of social policy preferences. Amer. Polit. Sci. Rev. **95**(4), 875-894 (2001)

Jacobsen, R., Snyder, J.W., and Saultz, A.: Informing or shaping public opinion? The influence of school accountability data format on public perceptions of school quality. Am. J. Educ. **121**(1), 1-27 (2014)

Jenkins, S.P.: Reranking and the analysis of income redistribution. Scott. J. Polit. Econ. **35**(1), 65–76 (1988)

Jenkins, S.P.: World income inequality databases: An assessment of WIID and SWIID. J. Econ. Inequal. **13**(4), 629–671 (2015)

Juncture: Juncture interview: Thomas Piketty on capital, labour, growth and inequality. 14 May 2014, http://www.ippr.org/juncture/juncture-interview-thomas-piketty-on-capital-in-the-twenty-first-centur (2014)

Kahneman, D.: Thinking, Fast and Slow. Farrar, Straus and Giroux, New York (2011)

Kanbur, R., Wagstaff, A.: How useful is inequality of opportunity as a policy construct? Centre for Economic Policy Research, Discussion paper No. 10508 (2015)

Kandel, E., Lazear, E.: Peer pressure and partnerships. J. Polit. Economy **100**(4), 801-817 (1992)

Karabarbounis, L.: One dollar, one vote. Econ. J. **121**(553), 621–651 (2011)

Karadja, M., Mollerstrom, J., Seim, D.: Richer (and holier) than thou? The effect of relative income improvements on demand for redistribution. IFN Working Paper No. 1042 (2014)

Kenworthy, L., Pontusson, J.: Rising inequality and the politics of redistribution in affluent countries. Perspect. Polit. **3**(3), 449–471 (2005)

Klein, K.J.: Employee stock ownership and employee attitudes. A test of three models. J. Appl. Psychol. **72**(2), 319-332 (1987)

Kleven, H.J.: How can Scandinavians tax so much?. J. Econ. Perspect. **28**(4), 77-98 (2014)

Kruse, D.: Profit sharing and productivity: Microeconomic evidence from the United States. Econ. J. **102**(410), 24-36 (1992)

Kuznets, S: Economic growth and income inequality. Amer. Econ. Rev. **45**(1), 1-28 (1955)

Larcinese, V.: Voting over redistribution and the size of the welfare state: the role of turnout. Polit. Stud. **55**(3), 568–585 (2007)

Lasswell, H.: Who Gets What, When and How. Whittlesey House, New York (1936)

Lind, J.T.: Fractionalization and inter-group differences. Kyklos **60**(1), 123-139 (2007)

Lindert, P.: Growing Public: Social Spending and Economic Growth since the Eighteenth Century. Cambridge University Press, Cambridge (2004)

LISS: Imputation of income in household questionnaire LISS panel (2008)

LISS: Longitudinal Internet Studies for the Social sciences. CentERdata, Tilburg (2016)

Landman, T.: Issues and Methods in Comparative Politics. An Introduction (2nd Ed.). Routledge, London and New York (2003)

Litonjua, M.D.: The socio-political construction of globalization. Int. Rev. Mod. Sociol. **34**(2), 253-278 (2008)

Lubrano, M.: The Econometrics Of Inequality And Poverty, Lecture 4, http://www.vcharite.univ-mrs.fr/PP/lubrano/cours/Lecture-4.pdf (2015)

Mahler, V.A.: Electoral turnout and income redistribution by the state: a cross-national analysis of the developed democracies. Eur. J. Polit. Res. **47**(2), 161–183 (2008)

Mandelbrot, B.: Fractals and Scaling in Finance Discontinuity, Concentration, Risk. Springer, New York (1997)

Margalit, Y.: Costly Jobs: Trade-related layoffs, government compensation, and voting in US elections. Amer. Polit. Sci. Rev. **105**(1), 166-188 (2011)

Marshall, J., Fisher, S.D.: Compensation or constraint? How different dimensions of economic globalization affect government spending and electoral turnout. Br. J. Political Sci. **45**(02), 353-389 (2015)

Marx, P.: The effect of job insecurity and employability on preferences for redistribution in Western Europe. J. of Eur. Soc. Policy **24**(4), 351-366 (2014)

McDonald, J.B.: Some generalized functions for the size distribution of income. Econometrica **52**(3), 647–663 (1984)

Meade, J.E.: The theory of labour-managed firms and profit sharing. Econ. J. **82**(325), 402-428 (1972)

Meinhard, S., Potrafke, N.: The globalization–welfare state nexus reconsidered, Rev. Int. Econ. **20**(2), 271-287 (2012)

Meltzer, A.H., Richard, S.F.: A rational theory of the size of government. J. Polit. Econ. **89**(5), 914–927 (1981)

Mettler, S.: Our hidden government benefits. The New York Times, September 19, 2011 (2011)

Mettler, S. The Submerged State: How Invisible Government Policies Undermine American Democracy. University of Chicago Press (2011b)

Mettler, S., Koch, J.: Who perceives government's role in their lives?. Assessing the impact of social policy on visibility. Working paper, retrieved from: http://government.arts.cornell.edu/assets/faculty/docs/mettler/PerceptionGovt-KochMettler-022812.pdf (2012)

Milanovic, B.: True world income distribution, 1988 and 1993: first calculation based on household surveys alone. Econ. J. **112**(476), 51–92 (2002)

Moene, K.O., Wallerstein, M.: Inequality, social insurance, and redistribution. Amer. Polit. Sci. Rev. **95**(4), 859-874 (2001)

Mughan, A., Bean, C., McAllister, I.: Economic globalization, job insecurity and the populist reaction. Elect. Stud. **22**(4), 617-633 (2003)

Mughan, A., Lacy, D.: Economic performance, job insecurity and electoral choice. Br. J. Political Sci. **32**(3), 513-533 (2002)

Neumark, D.: Wage differentials by race and sex: The roles of taste discrimination and labor market information. Ind. Relat. **38**(3), 414-445 (1999)

Niehues, J.: Subjective perceptions of inequality and redistributive preferences: An international comparison. IW-TRENDS Discussion Papers, 2 (2014)

Norton, M.I., Ariely, D.: Building a better America-One wealth quintile at a time. Perspect. Psychol. Sci. **6**(1), 9-12 (2011)

Oaxaca, R.: Male-female wage differentials in urban labor markets. Int. Econ. Rev. **14**(3), 693-709 (1973)

OECD: Income Distribution database (IDD). OECD, Paris (2015)

Okun, A.: Equality and Efficiency: The Big Tradeoff. Brookings Institution Press, Washington, D.C. (1975)

Olson, M.: The Logic of Collective Action: Public goods and the theory of group. Harvard University Press, Cambridge, Mass. (1965)

Page, M., Roemer, J.E.: The US fiscal system as an opportunity equalizing device. In: Kevin, A., Glenn, H., Hubbard, R. (Eds): Inequality and Tax Policy. American Enterprise Institute Press, Washington D.C. (2001)

Pencavel, J.: Worker cooperatives and democratic governance. IZA Discussion Papers, No. 6932 (2012)

Peragine, V.: Measuring and implementing equality of opportunity for income. Soc. Choice Welfare **22**(1), 187-210 (2004)

Persson, T., Tabellini, G.: Political Economics: Explaining Economic Policy. MIT Press, Cambridge (2000)

Pforr, K.: femlogit-Implementation of the multinomial logit model with fixed effects. Stata J. **14**(4), 847-862 (2014)

Pierce, J. L., Rubenfeld, S.A., Morgan, S.: Employee ownership: A conceptual model of process and effects. Acad. Manage. Rev. **16**(1), 121-144 (1991)

Pierson, P.: The new politics of the welfare state. World Polit. **48**, 143-179 (1996)

Pierson, P.: Increasing returns, path dependence, and the study of politics. Amer. Polit. Sci. Rev. **94**(2), 251-267 (2000)

Pierson, P.: When effect becomes cause: Policy feedback and political change. World Polit. **45**(4), 595-628 (1993)

Pignataro, G.: Equality of Opportunity: Policy and measurement paradigms. J. Econ. Surveys **26**(5), 800-834 (2012)

Piketty, T.: Social mobility and redistributive politics. Quart. J. Econ. **110**(3), 551-584 (1995)

Piketty, T.: Capital in the Twenty-First Century. The Belknap Press of Harvard University Press, Cambridge, Mass. (2014)

Pinkovskiy, M., Sala-i-Martin, X.: Parametric estimations of the world distribution of income, NBER Working Paper 15433 (2009)

Podivinksy, J.M., Stewart, G.: Why is labour-managed firm entry so rare? An analysis of UK manufacturing data. J. Econ. Behav. Organ. **63**, 177-192 (2007)

Putterman, L., Roemer, J. E., Silvestre, J.: Does egalitarianism have a future?. J. Econ. Lit. **36**(2), 861-902 (1998)

Putterman, L.: After the employment relation: problems on the road to enterprise democracy in: Bowles, S., Gintis, H., Gustafsson, B. (Eds.): Markets and Democracy: Participation, Accountability, and Efficiency. Cambridge University Press, Cambridge (1993)

Rawls, J.: A Theory of Justice. Harvard University Press, Cambridge, Mass. (1971)

Rehm, P.: Risks and redistribution an individual-level analysis. Comp. Polit. Stud. **42**(7), 855-881 (2009)

Risse, M. What equality of opportunity could not be. Ethics **112**(1), 720-747 (2002)

Rodrik, D.: Political Economy of Trade Policy. In G. Grossman and K. Rogoff (Eds.): Handbook of International Economics **3**, 1457-1494 (1995)

Roemer, J.E: A pragmatic theory of responsibility for the egalitarian planner. Philos. Public Aff. **22**(2), 146-166 (1993)

Roemer, J. E.: Equality of Opportunity. Harvard University Press (1998)

Roemer, J.E.: Why the poor do not expropriate the rich: an old argument in new garb. J. Public Econ. **70**(3), 399-424 (1998b)

Roemer, J. E., Aaberge, R., Colombino, U., Fritzell, J., Jenkins, S.P., Lefranc, A., Marx, I., Page, M., Pommer, E., Ruiz-Castillo, J., Jesus San Segundo, M., Tranaes, T., Trannoy, A., Wagner, G.G., Zubiri, I.: To what extent do fiscal regimes equalize opportunities for income acquisition among citizens?. J. Public Econ. **87**(3), 539–565 (2003)

Roemer, J.E.: Responsibility in egalitarian theory. Working paper, Yale University (2009)

Roemer, J.E.: On several approaches to equality of opportunity. Econ. Philos. **28**(2), 165-200 (2012)

Roemer, J.E., Trannoy, A.: Equality of opportunity. Cowles Foundation Discussion Paper n. 1921 (2013)

Samuelson, P.: Wages and interest: A modern dissection of Marxian economic models. Amer. Econ. Rev. **47**(6), 884-894 (1957)

Sandler, T., Tschirhart, J.: Club theory: Thirty years later. Public Choice **93**(3-4), 335–355 (1997)

Scervini, F.: Empirics of the median voter: democracy, redistribution and the role of the middle class. J. Econ. Inequal. **10**(4), 529–550 (2012)

Scheve, K., Slaughter, M.J.: Economic insecurity and the globalization of production, Am. J. Pol. Sc. **48**(4), 662-674 (2004)

Schmidt, S.R: Long-run trends in workers' beliefs about their own job security: Evidence from the General Social Survey. J. Lab. Econ. **17**(4), 127-141 (1999)

Schwartz, J.: Where did Mill go wrong?: Why the capital managed firm rather than the labor managed enterprise is the predominant organizational form in market economies. Ohio St. L. J. **73**(2), 219-285 (2012)

Sen A.: Equality of what?. In: McMurrin S Tanner Lectures on Human Values, Vol. 1. Cambridge University Press, Cambridge (1980)

Shapiro, I.: Why the poor don't soak the rich. Daedalus **131**(1), 118-128 (2002)

Singh, S.K., Maddala, G.S.: A function for the size distribution of incomes. Econometrica **44**(5), 963–970 (1976)

Sinn, H.W.: The New Systems Competition. John Wiley & Sons (2008)

Socio-Economic Panel (SOEP): Data of the years 1984-2012, version 29.1, SOEP, doi: 10.5684/soep.v29.1 (2014)

Streeck, W.: The crises of democratic capitalism. New Left Rev., **71**, 5-29 (2011)

Tirole, J.: Procurement and renegotiation. J. Polit. Economy **94**(2), 235-259 (1986)

Tversky, A., Kahneman, D.: Availability: A heuristic for judging frequency and probability. Cognitive Psychol. **5**(2), 207-232 (1973)

Unger, B.: Room for Manoeuvre: Choices Left for National Economic Policy Making (Habilitation) (1998)

Unger, B., van der Linde, D., Getzner, M. (Eds.): Public or Private Goods? Redefining Res Publica. Edward Elgar, Cheltenham (2017)

Van Zanden, J.L., Baten, J., Foldvari, P., van Leeuwen, B.: The changing shape of global inequality 1820–2000; exploring a new dataset. Rev. Income Wealth **60**(2), 279–297 (2014)

Vandenbroucke, F.: Social Justice and Individual Ethics in an Open Society: Equality, Responsibility and Incentives. Springer, Berlin (2001)

Varian, H.R.: Redistributive taxation as social insurance. J. Public Econ. **14**(1), 49-68 (1980)

von Hippel, P. T., Scarpino, S. V., Holas, I. Robust estimation of inequality from binned incomes. Sociol. Methodol., doi: 10.1177/0081175015599807 (2015)

Walter, S.: Globalization and the welfare state: Testing the microfoundations of the compensation hypothesis. Int. Stud. Q. **54**(2), 403-426 (2010)

Watts, H., Workman, L., Berrow, T., Gardner, W.: Sex differences in IQ score predictions in higher education. Journal of further and higher education **21**(1), 73-82 (1997)

World Bank: World Development Indicators. World Bank, Washington DC (2015)

WVS: World Values Survey. Retrieved from http://www.worldvaluessurvey.org (2016)

Zanotti, A.: The strength of an intersectorial network. In: Zevi, A., Zanotti, A., A. Zelaia (Eds.): Beyond the Crisis: Cooperatives, Work, Finance. CECOP, Brussels (2012)

Nederlandse samenvatting

Dit proefschrift richt zich op de vraag hoe politieke gelijkheid in democratieën zich verhoudt tot economische ongelijkheid. De *herverdelingsthese* stelt dat in democratieën een toename in de inkomensongelijkheid de roep om herverdeling van inkomen versterkt (Romer 1975, Roberts 1977 en Meltzer en Richard 1981). In veel ontwikkelde economieën is de afgelopen decennia de inkomensongelijkheid toegenomen. De wereld is daarmee nu ons laboratorium om deze theorie opnieuw te toetsen. Waarom zijn bepaalde democratieën niet in staat gebleken de toename in inkomensongelijkheid te beperken? (Bonica et al., 1995).

In Nederland is de netto inkomensongelijkheid de afgelopen decennia relatief constant gebleken. Jaarlijks terugkerende 'koopkrachtplaatjes' liggen hieraan deels ten grondslag. Zij vormen daarmee haast het geïnstitutionaliseerde bewijs voor de herverdelingsthese. Gegeven verwachtingen dat technologische veranderingen (Freeman 2015) of de verhouding tussen de groeivoet van de economie en het rendement op kapitaal (Piketty 2014) een toenemende druk op de inkomensverdeling zullen vormen, is deze vraag met een blik op de toekomst echter ook voor Nederland relevant.

In dit proefschrift wordt de herverdelingsthese op een nieuwe wijze getoetst. Het proefschrift draagt daarmee bij aan de literatuur over ongelijkheid en democratie en versterkt het begrip van de grote verscheidenheid in herverdeling tussen landen. Het gaat daarnaast in op de oorzaken en gevolgen van inkomensongelijkheid. In deze samenvatting licht ik de theoretische achtergrond en de afzonderlijke hoofdstukken uit dit proefschrift toe.

Met de *herverdelingsthese* is de centrale verwachting in dit proefschrift dat grotere ongelijkheid leidt tot meer herverdeling. Deze verwachting rust op twee onderliggende assumpties, één aangaande stemgedrag en één aangaande politieke besluitvorming. De these heeft slechts verklaringskracht wanneer zowel voorkeuren voor herverdeling sterk samenhangen met inkomen (het rationele keuzemodel van stemgedrag) en het politieke systeem zich richt op de mediane kiezer (het mediane-kiezermodel). Hoe ongelijker de verdeling van inkomen, hoe relatief slechter af deze mediaankiezer is en hoe sterker de vraag naar herverdeling van inkomen wordt, gegeven de onderliggende preferentiestructuur. Met de eerste twee hoofdstukken in dit proefschrift raak ik aan deze afzonderlijke assumpties. Hoofdstuk 2 gaat na in hoeverre de politieke besluitvorming zich richt op de mediaankiezer. In hoofdstuk 3 wordt de onderliggende preferentiestructuur aan toetsing onderworpen.

Er bestaat een grote verscheidenheid in de mate waarin landen inkomen herverdelen. Dit stelt ons in staat de herverdelingsthese empirisch te toetsen. In hoeverre hangt de mate van

herverdeling samen met de initiële inkomensongelijkheid? In hoofdstuk 2 wordt een nieuwe methode gepresenteerd om deze vraag te toetsen. Met slechts een beperkt aantal datapunten (de Gini en het gemiddelde inkomen per hoofd) kan onder de veronderstelling van een lognormale verdeling van inkomen worden nagegaan of de bepalende kiezer in een groep OESO-landen zich rond de mediaan bevindt. Een beslissende kiezer anders dan de mediaankiezer kan wijzen op onevenredig verdeelde politieke invloed of opkomst bij verkiezingen.

Bevindingen in dit hoofdstuk laten zien dat de bepalende kiezer in deze groep democratische en ontwikkelde economieën gemiddeld de mediaankiezer is. Het mediane kiezersmodel en daarmee de herverdelingsthese lijken empirisch gemiddeld te houden. Tegelijk bestaan er landen waar deze dynamiek niet opgaat. Deze verschillen lijken deels institutioneel verklaard te kunnen worden. Zo hangt de mate van herverdeling sterk samen met het type welvaartsstaat (naar Esping-Anderson 1990).

In hoofdstuk 3 wordt de preferentiestructuur onderliggend aan de herverdelingsthese aan toetsing onderworpen. Hangt de steun voor meer herverdeling daadwerkelijk samen met inkomen? Een nieuwe methode laat zien hoe met data op microniveau een distinctie aangebracht kan worden tussen de daadwerkelijke en gepercipieerde inkomenspositie van huishoudens. Dit hoofdstuk maakt gebruik van het feit dat veel kiezers niet in staat zijn zichzelf te plaatsen in de inkomensverdeling. Indien kiezers hun voorkeuren zouden laten afhangen van hun inkomenspositie, zou de *gepercipieerde* inkomenspositie van een kiezer zijn of haar voorkeuren voor herverdeling sterker moeten verklaren dan de daadwerkelijke inkomenspositie—veel kiezers onbekend. Voorkeuren van kiezers die hun positie in de inkomensverdeling kennen worden daarom vergeleken met voorkeuren van kiezers die hun positie juist over- of onderschatten.

Uitkomsten in dit hoofdstuk laten echter zien dat de daadwerkelijke positie van kiezers in de inkomensverdeling bepalender is voor voorkeuren dan de gepercipieerde positie. Sterker nog, gegeven de daadwerkelijke inkomenspositie van een huishouden hebben percepties van de inkomenspositie geen toegevoegde verklaringskracht. Voorkeuren voor herverdeling lijken daarmee—tegengesteld aan de premisse van de herverdelingsthese—niet gebaseerd te zijn op een strikt rationele afweging van de kosten en baten van hogere belastingen. Dit hoofdstuk geeft aanleiding te geloven dat factoren die sterker samenhangen met de daadwerkelijke dan met de gepercipieerde inkomenspositie van een huishouden bepalend zijn voor voorkeuren over de inkomensverdeling. Dergelijke factoren kunnen onder andere de sociale, werk- of leefomgeving, of—gegeven beperkte sociale mobiliteit—de sociale achtergrond van kiezers zijn.

Terwijl hoofdstuk 2 en 3 zich richten op de vraag in hoeverre herverdeling samenhangt met ongelijkheid van *uitkomsten*, beschouwt hoofdstuk 4 de vraag in hoeverre het fiscale stelsel in het Verenigd Koninkrijk, Nederland en Duitsland in staat is ongelijkheid in *kansen* te verminderen. In dit kader zouden fiscale regelingen zo moeten worden vormgegeven dat zij slechts dat deel van de ongelijkheid verminderen dat resulteert van omstandigheden buiten de invloedssfeer van individuen, bijvoorbeeld sociale achtergrond. Bevindingen laten zien dat in het Verenigd Koninkrijk, Nederland en Duitsland het opleidingsniveau van ouders een sterke invloed heeft op de inkomensverwerving van hun kinderen. Het opheffen van deze verschillen vraagt om meer herverdeling dan momenteel wordt geboden. Resultaten zijn echter sterk afhankelijk van de loonelasticiteit van het arbeidsaanbod. Wanneer deze beperkt is en werknemers hun arbeidsaanbod dus slechts beperkt aanpassen aan belastingverhogingen, vraagt kansenongelijkheid in het Verenigd Koninkrijk, Nederland en Duitsland hogere belastingen en meer herverdeling. Hoe sterker deze arbeidsaanbodreactie, hoe minder overheden via belastingen en herverdeling aan kansengelijkheid kunnen bijdragen. Er zijn daarnaast specifieke verschillen tussen de drie landen. Zo is in Nederland migratieachtergrond sterk bepalend voor inkomensverwerving, in Duitsland achtergrond in het voormalige oost- of west Duitsland bepalend en is in het Verenigd Koninkrijk het type basisonderwijs bepalend. Over tijd neemt de kansengelijkheid in de drie landen toe.

Verklaringen voor de toegenomen inkomensongelijkheid in bepaalde landen worden deels gezocht in toegenomen economische globalisering, die winnaars en verliezers en daarmee sterke verdelingseffecten kent. De literatuur geeft twee tegengestelde verwachtingen over het effect van globalisering op de inkomensongelijkheid. De compensatiehypothese stelt dat welvaartsstaten robuust zijn voor globalisering en zelfs kunnen uitdijen om een grotere groep verliezers van globalisering te compenseren (Rodrik 1995). De beperkingshypothese stelt dat globalisering de manoeuvreerruimte van staten verkleint, en onder invloed van globalisering belastinginkomsten en daarmee overheidsbudgetten en de welvaartsstaat krimpen. Hoofdstuk 5 toetst deze hypothesen op microniveau. Verandert toegenomen economische onzekerheid ten gevolge van globalisering de partijvoorkeuren en het stemgedrag van kiezers in het Verenigd Koninkrijk en Duitsland? Er lijkt in het Verenigd Koninkrijk bewijs voor de compensatiehypothese. Toegenomen baanonzekerheid gecombineerd met hoge werkloosheid binnen bepaalde sectoren verklaart over tijd veranderingen in partijvoorkeuren en kiesgedrag. Bevindingen zijn robuust, maar een vergelijking met Duitsland laat zien dat deze bevindingen specifiek zijn aan het VK. In Duitsland lijkt er geen robuust effect van economische noch baanonzekerheid te zijn op partijvoorkeuren of kiesgedrag.

Beleid gericht op het verkleinen van de verschillen in inkomen vóór belastingen vermindert de druk op correctief inkomensbeleid. Een van de gesuggereerde maatregelen om met 'predistributie' loonverschillen binnen bedrijven te beperken is de inzet op breed gedragen aandeelhouderschap van werknemers in hun bedrijf. Hoofdstuk 6 zet hier in een analytisch model twee uitersten tegen elkaar af: Enerzijds bedrijven waar het aandeelhouderschap volledig bij werknemers ligt en de productiefactor arbeid kapitaal inhuurt (werknemerscoöperaties) en anderzijds de conventionele firma, waarin kapitaal arbeid inhuurt zonder aandeelhouderschap van werknemers. Een overzicht van de literatuur laat zien dat er zich mogelijke marktfalen voordoen in de conventionele firma. Vanwege het dilemma van de collectieve actie ontstaan bedrijven met een sterkere rol voor werknemers echter niet vanzelf. Dit hoofdstuk laat zien dat wanneer een groei van dergelijke bedrijven om sociale of economische redenen wenselijk zou zijn, overheidsbeleid zich enkel hoeft te richten op de startfase om dit collectieve actieprobleem te verminderen.

Concluderend lijkt op basis van de bevindingen van dit proefschrift een toename in de inkomensongelijkheid druk op overheden te vergroten om inkomen te herverdelen. Bevindingen zijn sterk afhankelijk van de kosten van herverdeling. Deze kosten komen tot uiting in de mate waarin het arbeidsaanbod reageert op belastingen op inkomen. Hoe lager deze gevoeligheid, hoe hoger de belastingtarieven die houdbaar zijn onder een meerderheidsbesluit (hoofdstuk 2) of hoe meer ruimte er is voor overheden om fiscaal beleid in te zetten om kansengelijkheid te realiseren (hoofdstuk 4). Overheidsbeleid kan zich behalve op herverdeling ook richten op het verkleinen van deze arbeidsaanbodreactie. Met specifiek beleid, waaronder subsidies aan goederen en diensten die complementair zijn aan het arbeidsaanbod, zoals kinderopvang en ouderenzorg, kunnen verstoringen van belasting op arbeid verkleind worden. De overheid kan zich daarnaast met 'predistributief' beleid richten op het verminderen van inkomensverschillen vóór belastingen. Hiermee kan de druk op herverdeling van inkomen verminderd worden. Hoofdstuk 6 beschouwt slechts een van de mogelijke manieren om gelijkere verdeling van bruto-inkomens te realiseren.

Onderwijs vervult tenslotte een speciale rol als voorbeeld van beleid dat zowel invloed heeft op de arbeidsaanbodreactie en op de verdeling van inkomen. Onderwijs vermindert op de lange termijn de arbeidsaanbodreactie van belastingen (Bovenberg en Jacobs 2005), maar is ook een grote gelijkmaker wat betreft de verschillen in inkomens. Daarmee zijn investeringen in onderwijs een voorbeeld van beleid waarbij economische gelijkheid en economische groei samengaan (Putterman et al. 1998; Bowles 2012).

Curriculum Vitae

Daan van der Linde (1988) is a WSI-EUCOS PhD candidate at Utrecht University School of Economics (U.S.E.), Utrecht University, the Netherlands. He holds a BSc in Political Science from Radboud University, the Netherlands and a MSc (cum laude) in Economics of Public Policy and Management from Utrecht University School of Economics. His research focuses on public economics, specifically concerning inequality and the role of (local) government. He has published in *Journal of Economic Inequality*, *Local Government Studies* and the *Journal of Economic Issues*, and edited two books with Edward Elgar Publishing. Daan has presented work at international conferences, including the ECPR General Conference in Glasgow (2014) and Montrèal (2015), the SASE Annual Conference in Chicago (2014), and the ECPR Standing Group on Regulatory Governance conference in Barcelona (2014). He participated in the Berlin Summer School in Social Sciences at the Berlin Graduate School of Social Sciences (BGSS) at Humboldt-Universität zu Berlin and the WZB Berlin Social Research Center (2013). Currently, Daan is working at the Ministry of Economic Affairs for the Support Department of General Economic Policy (AEP).

Publications

Unger, B., Getzner, M. & van der Linde, D.E. (forthcoming). *Public or Private Goods?: Redefining Res Publica*. Cheltenham: Edward Elgar Publishing.

Groot, L.F.M. & van der Linde, D.E. (2017). The Labor Managed Firm: Permanent or start-up subsidies?. Forthcoming in *Journal of Economic Issues*.

Groot, L.F.M. & van der Linde, D.E. (2016). Income inequality, redistribution and the position of the decisive voter. *The Journal of Economic Inequality*, **14**(3), 269-287.

Bikker, J.A. & van der Linde, D.E. (2016). Scale economies in local public administration. *Local Government Studies*, **42** (3), (pp. 441-463).

van der Linde, D.E. (2015). Complementarity and labor market institutions. In Brigitte Unger (Ed.), *The German Model: Seen By Its Neighbours*. SE Publishing.

Bikker, J.A. & van der Linde, D.E. (2015). Schaalvoordelen bij de organisatie van het algemeen lokaal bestuur. *Economisch Statistische Berichten*, **100**(4711), 344-347.

van der Linde, D.E., Falcke, S., Koetsier, I. & Unger, B. (2014). Do Wages Affect Politicians' Performance? A regression discontinuity approach for Dutch municipalities. *UU USE Tjalling C. Koopmans Research Institute Working Paper*, 14(15)

Unger, B. & van der Linde, D.E. (2013). *Research Handbook on Money Laundering*. Cheltenham: Edward Elgar Publishing.

U.S.E. Dissertation list

USE 001 **Bastian Westbrock** (2010): *Inter-firm networks: economic and sociological perspectives.*

USE 002 **Yi Zhang** (2011): *Institutions and International Investments: Evidence from China and Other Emerging Markets.*

USE 003 **Ryan van Lamoen** (2011): *The Relationship between Competition and Innovation: Measuring Innovation and Causality.*

USE 004 **Martijn Dröes** (2011): *House Price Uncertainty in the Dutch Owner-Occupied Housing Market*

USE 005 **Thomas van Huizen** (2012): *Behavioural Assumptions in Labour Economics: Analysing Social Security Reforms and Labour Market Transitions*

USE 006 **Martijn Boermans** (2012): *International Entrepreneurship and Enterprise Development.*

USE 007 **Joras Ferwerda** (2012): *The Multidisciplinary Economics of Money Laundering*

USE 008 **Federico D'Onofrio** (2013): *Observing the country: a history of Italian agricultural economics, 1900-1930.*

USE 009 **Saraï Sapulete** (2013): *Works Council Effectiveness: Determinants and Outcomes.*

USE 010 **Britta Hoyer** (2013): *Network Formation under the Threat of Disruption.*

USE 011 **Coen Rigtering** (2013): *Entrepreneurial Orientation: Multilevel Analysis and Consequences.*

USE 012 **Beate Cesinger** (2013): *Context and Complexity of International Entrepreneurship as a Field of Research.*

USE 013 **Jan de Dreu** (2013): *Empirical essays on the governance of financial institutions.*

USE 014 **Lu Zhang** (2013): *Industrial Specialization: Determinants, Processes and Consequences.*

USE 015 **Matthias Filser** (2013): *Strategic Issues in Entrepreneurship and Family Business Research.*

USE 016 **Mikko Pohjola** (2013): *A Compilation of Studies on Innovation in Firms: Capabilities, Strategies, and Performance.*

USE 017 **Han-Hsin Chang** (2013): *Heterogeneity in Development.*

USE 018 **Suzanne Heijnen** (2014): *Analyses of sickness absence*

USE 019 **Mark Kattenberg** (2014): *The Economics of Social Housing: Implications for Welfare, Consumption, and Labor Market Composition*

USE 020 **Daniel Possenriede** (2014): *The Economics of Temporal and Locational Flexibility of Work*

USE 021 **Dirk Gerritsen** (2014): *The Relevance of Security Analyst Opinions for Investment Decisions.*

USE 022 **Shiwei Hu** (2014): *Development in China and Africa*

USE 023 **Saara Tamminen** (2014*): Heterogeneous Firms, Mark-Ups, and Income Inequality*

USE 024 **Marcel van den Berg** (2014): *Does Internationalization Foster Firm Performance?*

USE 025 **Emre Akgündüz** (2014): *Analyzing maternal employment and child care quality.*

USE 026 **Jasper Lukkezen** (2014): *From Debt Crisis to Sovereign Risk.*

USE 027 **Vesile Kutlu** (2015): *Essays on Subjective Survival Probabilities, Consumption, and Retirement Decisions.*

USE 028 **Brigitte Crooijmans** (2015): *Leiden fusies tot efficiëntere woningcorporaties? Een exploratieve studie naar schaalvoordelen in de sociale huisvesting*

USE 029 **Andrej Svorenčík** (2015): *The Experimental Turn in Economics: a History of Experimental Economics.*

USE 030 **Secil Danakol** (2015): *Foreign Direct Investment, Foreign Aid and Domestic Entrepreneurship*

USE 031 **Ioana Deleanu** (2015): *Anti-Money Laundering Efforts: Failures, Fixes and the Future.*

USE 032 **Jaap Oude Mulders** (2016): *Organizations, managers, and the employment of older workers after retirement*

USE 033 **Malka de Castro Campos** (2016): *Private Consumption-Savings Behavior and Macroeconomic Imbalances*

USE 034 **Tahereh Rezai Khavas** (2016): *Fairness concerns and cooperation in context*

USE 035 **Joyce Delnoy** (2016): *Auctions with Competing Sellers and Behavioral Bidders*

USE 036 **Krista Bruns** (2017): *Emergence and Diffusion of Institutions and their Effect on Economic Growth*