

Prepared for APSA, August 2014. Please do not cite without permission.

## Great Expectations: Income Expectations, Income Realizations and Attitudes towards Redistribution\*

*Sebastian Barfort*<sup>†</sup>

Few questions are more relevant in light of the recent economic hardships caused by the Great Recession than how adverse economic experiences influence voters' preferences over government redistribution. Using a unique Danish dataset merging a large repeated survey carried out during the financial crisis with detailed administrative registry data at the individual level allows me to simultaneously measure preferences and expectations about future economic events, and match these expectations with objective, high-quality information about what income was actually obtained in the marketplace. This allows me in ways previously not possible to analyze the effect of *unexpected* income shocks on redistributive preferences. The empirical analysis reveals that unexpected income shocks lead pro-market voters to decrease their demand for redistribution, whereas I find no effect on respondents who are ideologically skeptical of markets. Furthermore, I find suggestive evidence that market-skeptic respondents change their beliefs in favor of more pro-market views.

\*I would like to thank David Dreyer Lassen and Howard Rosenthal for their help and comments, as well as participants at the 2014 Danish Public Choice Workshop in Copenhagen and the 2014 meeting of the European Political Science Association in Edinburgh. Financial support for the project "Hard Times, Hard Choices" under the Sapere Aude program of the Danish Council for Independent Research is gratefully acknowledged. All errors are my own.

<sup>†</sup>PhD. student, Department of Economics, University of Copenhagen. email: [sebastian.barfort@econ.ku.dk](mailto:sebastian.barfort@econ.ku.dk)

# 1 Introduction

Millions of people across the world have experienced unemployment and decreased incomes in the aftermath of the Great Recession of 2008, and the crisis has pushed the debate over the role of government in providing redistribution and unemployment benefits back to the forefront of public debate. In the U.S, the Great Recession has been credited with the rise of both the Tea Party and the Occupy Wall Street movements. By contrast, voting outcomes in Europe have shown an unprecedented dominance of conservative parties. In 2011, with the election of Mariano Rajoy in Spain, Europe witnessed a situation in which, for the first time in modern history, every major capital in the continent, from Lisbon to Helsinki, was home to a conservative government.

These recent social and political developments raise the question how voters' political preferences change during times of economic hardship. Analyzing this question is key to understanding the causes of government policy. Recent work by Saez and Stantcheva (2013) shows how optimal taxation depends crucially on the distributional preferences of the electorate, so understanding how voters' political preferences change has important implications for tax policy. At the same time, explaining preferences for redistribution is at the heart of the political economy research agenda. However, several challenges make this question difficult to answer empirically even in a panel setting where the same individuals are observed over time. Traditionally, the approach has been to examine the correlation between adverse economic events such as a loss of income and preferences for redistribution. However, this approach ignores the crucial role of *expectations*. To fix ideas, imagine we collect information about an individual in the beginning of two consecutive periods, and assume we observe a decrease in income from one period to the next. Identifying the effect on redistributive preferences is impossible without information about expectations. Optimistic agents might infer through a learning process that the expected value of future earnings is lower than expected, and could increase their demand for redistribution accordingly. The opposite could be true for agents who were pessimistic about the future. The point here is not to hypothesize over the correct explanation, but to point out how the effect of individual economic hardship on political preferences is consistent with many alternative specifications of preferences and expectations, so information about situations where expectations were *not* met is crucial for identification. So far, this view has gone largely unnoticed in the empirical political economy literature.

This paper analyzes the effects of negative income shocks on the redistributive preferences of a large and representative sample of individuals collected in

Denmark while the financial crisis was at its peak during 2010-12, a situation where political opinions and expectations could potentially be more unstable than during normal times (Alt 1979). Since my interest is on the political effects of economic hardship, I focus on negative income shocks, that is, events where aggregate income failed to live up to expectations. The data combines a repeated survey with high quality administrative data available through Statistics Denmark. Respondents are explicitly interviewed about their expectations over income during a given year, and the combination of survey and administrative data allows me to match their responses with precise information about their actual income history. This provides a unique opportunity to isolate the effect of *unexpected* changes in individual economic circumstances on redistributive preferences in ways previously not possible in the literature. This paper, to my knowledge, is the first to explicitly match expectations with objective information about actual outcomes to study the effect of unexpected economic events in shaping political beliefs.

Two additional advantages of the approach used in this paper are worth pointing out. The first relates to sample size. Even during times of economic hardship, collecting a sample of individuals where a large enough proportion have experienced *unexpected* decreases in income to be able to statistically identify an effect requires a substantial sample from the population. The survey utilized in this paper covers more than 6,000 Danes yearly, which makes it possible to analyze effects of relatively rare events such as unexpected negative shocks to income. Second, the survey contains detailed information about the respondent's ideological beliefs about welfare policy, by which I think of as unidimensional and mapping ideological divides on economic welfare policy.

In the classic workhorse political economy model, preferences over redistribution are derived from an assumption of economic self-interest. Meltzer and Richard (1981), for example, derive agent  $i$ 's optimal voting scheme only from his relative position in the income distribution. Deriving empirical predictions of unexpected negative income shocks on redistributive preferences from such models are straight forward. Adverse economic events that - *ceteris paribus* - decrease the agent's relative standing in the income distribution should lead to increased demand for redistribution. In contrast, several theories from social psychology hold that ideological beliefs are key determinants of redistributive preferences. In particular, motivated reasoning proposes that individuals interpret events through reliance on a particular set of cognitive processes determined by their ideological beliefs (Kunda 1990). According to this view, two agents might have completely opposite (and mutually exclusive) interpretations of the same event since they rely

on their pre-existing beliefs when interpreting the evidence.

Traditionally, theories of motivated reasoning have been informally formulated, but recent theoretical interest has been devoted to incorporating these insights in a formal game-theoretic framework. Piketty (1995) analyzes a model in which agents have conflicting ideological views about the relative importance of luck and effort in determining market outcomes. Because the true return to effort is determined partly by government policy, two countries can converge to two different equilibria: one with high taxes and low return to effort and one with low taxes and high return to effort. This model is the first to show the link between ideological beliefs and preferences for redistribution within a formal framework. Building explicitly on a theory of motivated reasoning, Benabou and Tirole (2006) analyze why agents feel the need to form ideological beliefs. They introduce several key concepts. First, the reason agents form ideological views is because it serves a form of commitment device.<sup>1</sup> Second, it might be optimal for agents to interpret adverse events as supportive of their ideological beliefs when there are cognitive costs associated with challenging these beliefs. Applying these theories to the case of unexpected economic events yields different empirical predictions. According to this line of reasoning, some agents might decrease their demand for redistribution even if this is economically profitable in the short run when doing so represents a challenge to their ideological beliefs. Both Fong (2001), and Alesina and Giuliano (2009), find little empirical evidence to support the traditional political economy model at the individual level. Their studies seem to indicate that preferences for redistribution are better explained by beliefs about the fairness of market outcomes, or a history of personal misfortune, than for example current income.

The central finding of this paper is that unexpected negative income shocks are strongly related to decreases in demand for redistribution and increases the probability of voting for the centre-right, but only among agents who are ideologically pro-market. I find no significant effects for respondents who are ideologically skeptical of markets. These results are consistent across a wide range of specifications, and are unaffected by changing the income shock threshold, non-random assignment of negative income shocks, ceiling effects, etc. Furthermore, I find suggestive evidence that respondents who are market-skeptics change their ideological beliefs in response to an unexpected negative income shock in favor of more pro-market beliefs.

<sup>1</sup>Because agents find it difficult to motivate themselves toward providing an efficient level of effort, holding strong ideological views about the world works as a form of self-commitment mechanism when switching ideological views is costly.

These results yield strong empirical support to theories of motivated reasoning holding that agents interpret events differently depending on their ideological beliefs, and that some agents might be willing sacrifice short term economic gains when this implies challenging their ideological views. Furthermore, the results supplement the literature on political effects of economic hardship (Alt 1979; Giuliano and Spilimbergo 2009) and in particular recent evidence on redistributive effects of the Great Recession (Kuziemko et al. 2013; Mian, Sufi, and Trebbi 2012). Fisman, Jakiela, and Kariv (2013), focusing on macroeconomic shocks, compare behavior in experiments measuring distributional preferences during the Great Recession to behavior in identical experiments conducted during the preceding economic boom. Their result indicate a causal relationship between negative economic shocks and decreased support for redistribution. They interpret this as evidence that recessions increase efficiency concerns in the population. These findings are supported in Fisman, Jakiela, and Kariv (2014). My results indicate similar effects for microeconomic shocks, although I find differential effects depending on ideology, something Fisman, Jakiela, and Kariv (2013) are not able to investigate. Using U.S survey data collected between 2007 and 2011, Margalit (2013) finds that individual economic hardship such as a loss of employment leads to increasing support for redistribution, but the effects of an (expected) decrease in household income are unclear.

The remainder of the paper is organized as follows. Sections 2 and 3 outline the Danish context and introduces the survey and administrative data in detail. In particular, I explain how probabilistic expectations are elicited and how the main independent economic surprise variables are defined. Section 4 outlines the econometric approach and presents the main results, as well as a battery of robustness tests. Section 5 offers concluding remarks.

## 2 Danish Economic and Political Context

Since WWII, Denmark has had alternating centre-right and centre-left governments. In 2001, a centre-right coalition led by the Liberal Party under Prime Minister Anders Fogh Rasmussen, and also including the Conservatives, took over after eight years of Social Democratic led coalition governments. The centre-right government was reelected twice - in 2004 and 2007 - and in 2008 the Prime Minister was appointed General Secretary of NATO and was succeeded, without elections, by the new head of the Liberal Party, Lars Løkke Rasmussen. In September 2011, the centre-right coalition was replaced in a national election, and Social

Democrat Helle Thorning Schmidt became Denmark's first female Prime Minister, having narrowly led the centre-left bloc - containing the Social Democratic, Social Liberal and Socialist People's parties as coalition partners, and supported by the Red-Green Alliance - to victory over Lars Løkke Rasmussen's centre-right coalition.

The financial crisis hit Denmark in late 2008, with unemployment levels rising from its lowest point around 3% to around 8% in 2011.<sup>2</sup> Going into the crisis, the Danish public sector had a considerable primary surplus and one of the lowest levels of debt of the OECD countries, but effects of discretionary policy measures were limited by the fact that Denmark is a small open economy highly dependent on the greater European economy. Thus the budget deficit increased dramatically - from 4.8% of GDP in 2008 to a deficit of about the same size in late 2010 - leaving Denmark with hard fiscal choices regarding welfare and pension reform. The centre-right government of Løkke Rasmussen relied primarily on austerity measures to improve public finances, and two decisions to reduce the amount of "flexicurity" in the labour market of which Denmark is well-known remain controversial today. The first step was taken in 2010 when the duration of unemployment benefits was cut in half to two years. The second was a decision to abolish a popular early retirement scheme, allowing people to retire at the age of 60 rather than 65. Both issues were key in the Løkke Rasmussen coalition's defeat in 2011.

The sharp rise in unemployment, and dissatisfaction with the government's economic performance more generally, were major issues in the 2011 election. In a Gallup poll conducted at the beginning of the campaign, 79% indicated that the economy was the most important issue with unemployment a close second at 62% (Stubager 2012). The centre-right's austerity policies were widely blamed for the failure to produce a stronger economic recovery. Despite this, the centre-left only just achieved a parliamentary majority. In fact, the Social Democrats actually lost one seat relative to the 2007 election, while the Liberals gained one seat. The change in government particularly reflected the rise of the Social Liberals at the expense of the Conservative People's party. Economic and welfare policy has been contentious throughout the centre-left's tenure since 2011, reflected for example in its actions to repeal the decision to reduce unemployment benefits following an agreement to instead reduce benefits in the final two years to 60% of their initial level.

<sup>2</sup>See unemployment data from Eurostat [here](#).

### 3 Combining Administrative and Survey Data

Data on income expectations, political attitudes, and voting, come from the Danish Panel Study of Income and Asset Expectations (Kreiner, Lassen, and Leth-Petersen 2013), a rolling panel survey of approximately 6,000 Danes beginning in 2010. Participants in the first wave were randomly selected among individuals in the Danish Central Person Register (CPR) with any positive amount of labor income in the period 1998-2004.<sup>3</sup> The survey is carried out by a professional survey firm, also responsible for the official Danish labor force surveys. Each survey lasts on average 10-12 minutes and covers on average 40 questions relating to economics and politics. The survey data is subsequently joined at the individual level with administrative register data from Statistics Denmark through the CPR-number. This number is used by all government institutions to store person specific information including information about earnings, contact to the public health care system, the educational system, and about the composition and place of residence of the household (Kreiner, Lassen, and Leth-Petersen 2011). The data are of very high quality. The tax register, the most important register for this study, contains more than 99% of individuals between the ages 15 and 70 in the population. It holds detailed information on earnings and wealth, including e.g. bonds, cash in banks, mortgages, and the sum of other loans. The tax registers are collected directly from the relevant third party sources: information on earnings is reported by employers, information on transfer income is reported by government agencies, information about the value of assets and liabilities is reported directly by banks and other financial institutions, and so on. A recent randomized tax auditing experiment documents that tax evasion is very limited in Denmark (Kleven et al. 2011): across all third party reported income categories, the tax evasion rate was consistently well below 1%. By contrast, the tax evasion rate was 17.1% for self-employment income. Since register income is less reliable for this group, I exclude self-employed in the analysis that follows.<sup>4</sup> All results are robust to the inclusion of this group in the analysis. Overall, the income data found in the tax registers for the remaining groups should be extremely accurate. The data are kept on servers at Statistics Denmark, and can be accessed only under comprehensive

<sup>3</sup>The response rate was 55%. Attrition to the second round was 31%, and new respondents were again sampled randomly from the CPR. Attrition to the third round was 31%.

<sup>4</sup>I also exclude respondents outside the labor force (i.e. students and retirees) from the analysis since their income is almost predetermined by government transfers. Including these groups in the analysis only introduces noise, and does not change the main conclusions in this paper. Available upon request.

security precautions. Only aggregated information such as descriptive statistics or regression coefficients can be extracted.

From the administrative records I also obtain information on a broad set of individual-level characteristics that are used as controls in the analysis, including age, educational attainment, home ownership, marital status, etc. All of this information is tied to the individual using his CPR number. Furthermore, I create mean and standard deviation of tax register income over the last 10 years. This provides me with a proxy for permanent income and precise information about past income volatility. Both variables are used as controls in the main specifications, but yield results interesting in their own right. For example, I find interesting correlations between permanent income and ideology and voting, and a correlation between past income volatility and the probability that a respondent experiences a negative income shock.

Before turning attention to the main independent variable, I briefly describe the political variables. Demand for redistribution is measured in two ways. The first measures demand for redistribution in accordance with the General Social Survey using a 5 point Likert scale. I recode the answers so a higher number means one is more favorable to redistribution. Second, I examine the effects of unexpected income shocks on a dummy variable, *vote intention*, which takes the value 1 if the respondent intends to vote for the centre-right coalition who held majority in the Danish parliament between 2001 and 2011, and 0 otherwise.<sup>5</sup> The key measure of ideology on welfare issues follows the theoretical literature and the World Value Survey, and ask respondents if success in life is determined primarily by hard work or luck and connections.<sup>6</sup> Survey questions are also used to measure risk aversion and whether the household plan expenses using a budget. It is important to account for risk averseness since one might interpret demand for redistribution as demand for insurance (Iversen and Soskice 2001; Mirrlees 1971). Risk aversion measures, for a given level of uncertainty, how much redistribution an individual demands, and failing to account for this aspect could lead to serious omitted variable bias. I use a dummy, *no budget*, taking the value 1 if the respondent

<sup>5</sup>This includes the parties Venstre, Konservative, Dansk Folkeparti and Ny Alliance. Results are robust to excluding the two latter parties who supported the coalition without serving in government.

<sup>6</sup>One might worry that the ideology question could conflate behavioral variables such as risk preferences or occupational sorting. I have investigated the relationship between ideology and risk averseness. Perhaps surprisingly, there is little evidence that risk averseness correlate with ideology. A Fisher exact test shows no statistical difference between the fraction of risk averse agents in the three ideology categories ( $p = 0.4$ ). Available upon request.

uses a budget to plan expenses, to analyze the characteristics of individuals who experience negative income shocks. The exact question wording and the associated response categories can be found in the appendix.

Figure 1 shows a histogram of demand for redistribution, and the proportion of respondents who switched categories when interviewed one year later. The figure should be read as follows: First, ignoring the coloring, the figure shows the fraction of respondents who placed themselves in the five categories in period  $t$ . Second, the colors indicate what level of redistribution the respondents within a given category reported in period  $t + 1$ . It is clear from the figure that around 40% of respondents prefer the middle category, and a larger fraction of respondents prefer higher to lower levels of redistribution. Furthermore, the colors reveal considerable within-person variation from one year to the next. Note that most respondents adjust their demand for redistribution with 1 point, while very few agents move from 5 to 1, or vice versa, indicating that while agents do adjust their demand for redistribution in response to new experiences, they are unlikely to dramatically change their political views over the short run.

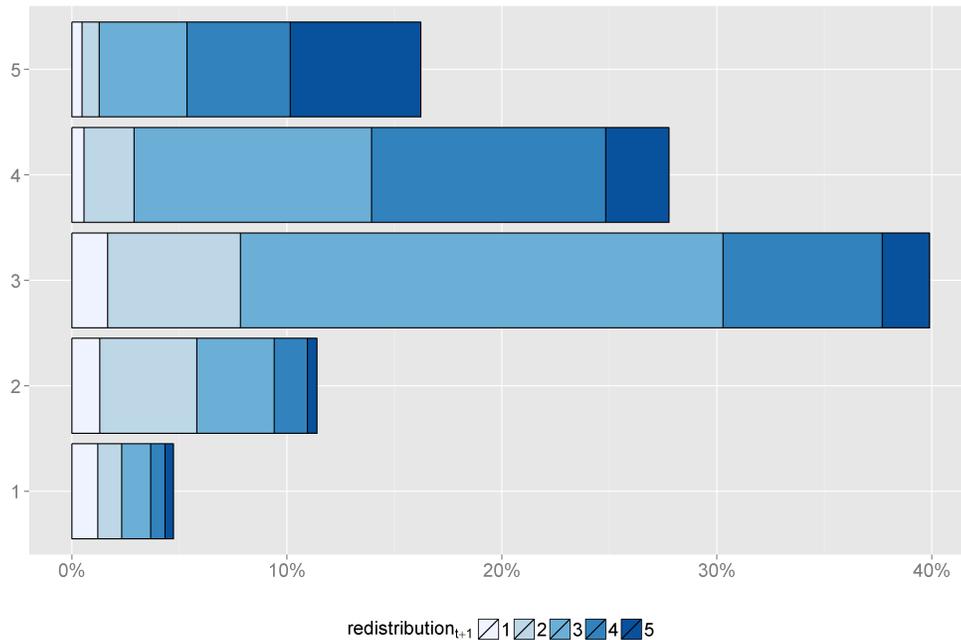


Figure 1: Histogram of the main dependent variable, *redistribution*, and movement within categories from one year to the next

### *Measuring Income Expectations*

The unique combination of merged survey and high quality register data allows me to directly quantify whether an agent's expectations about income were met during a given year. All interviews were carried out in January. The timing is important, since it implies that we can at the same time ask respondents about their economic and political experiences in the previous year, and, crucial to this paper, about their *expectations* over the year ahead. These questions can be used to construct a measure of expected income, which is matched with high quality information from the registers about the actual income trajectory of the agent. I use information about all major sources of income such as wage and capital income, government transfers, etc. However, since a few income sources included in tax register income are probably less salient to respondents, I exclude employers' pension contributions from the main income measure, but results are robust to the inclusion of all income sources.<sup>7</sup> This approach provides very precise individual level information about the difference between expected and realized income, which is crucial in order to construct a quantitative measure of whether income expectations were fulfilled.

Another important advantage of having access to register data is that it allows me to sidestep concerns that self-reported income correlates with ideology. A recent strand of papers report non-classical measurement error in self-reported income. Kreiner, Lassen, and Leth-Petersen (2011), for example, find that measurement error correlates with demographics such as education and age. Lassen and Hariri (2013) find that political factors correlate with self-reported income. In particular, conservatives tend to systematically over-report their incomes. Both studies highlight the necessity of having access to objective tax register income in order to avoid the systematic bias induced by comparing, for example, expected income in year  $t$  to self-reported income in  $t + 1$ .

Expectations can be measured in many ways, the two main survey-based options being verbal and probabilistic. The verbal approach asks respondents to report the strength of their belief that an event will occur by attaching a word from a set of options, such as 'very', 'fairly', etc. In contrast, the probabilistic approach asks respondents to report a set of probabilities that an event will occur. Manski (2004) shows that asking probabilistic elicitation questions for expectations is often the superior option. In principle, there are many ways to elicit expectations

<sup>7</sup>Pension contributions are not shown on the pay check nor in the tax return or the annual statement from the tax authorities, since it is not liable to taxation before being paid out.

over continuous variables such as expected income. One might ask respondents to report quantiles, or moments of the distribution such as the mean. Since our survey was conducted over the telephone, we follow Manski (2004) and try to elicit points on the agent's subjective probability distribution function by asking the respondent to provide us with the minimum and maximum amount of income he expects to earn during the year. Afterwards, the respondent is asked to report the probability that his yearly income will be less than the midpoint between these two numbers.

One challenging aspect is how to compute expected income based on the information given above. In particular, eliciting points on the agent's probability distribution function instead of moments implies that we have to make assumptions about the functional form of the subjective distributions. In this case the problem arises because we know the agent's estimated probability that he will earn less than the midpoint, but not the size of the difference. I follow Zeldes (1989) and Manski (2004) and assume that the subjective probability distribution function is normally distributed around the midpoint. In order to account for the fact that respondents might not estimate their minimum and maximum income perfectly, I choose the variance of the distribution so 90% of the probability mass lie within these boundaries.<sup>8</sup>

Based on these assumptions, *expected income* is computed as

$$(1) \text{ expected income}_{it} = p_{it} \text{lower quartile}_{it} + (1 - p_{it}) \text{upper quartile}_{it},$$

where  $p_{it}$  is the self-reported probability that the agent will earn less than the midpoint. The *expected income* variable thus measures the aggregate, pre-tax income agent  $i$  expects to earn over year  $t$  measured at the beginning of the year based on the assumptions stated above.

Figure 2 shows the distributions of the expected income measure defined above and tax register income.<sup>9</sup> Comparing the two density plots, it is clear that the distribution of expected income is slightly left-skewed compared to the distribution of tax register income, but also that expected income does a remarkably good job of mimicking the distribution of tax register income. The few small kinks in the distribution of *expected income* reflect that respondents to some degree bunch

<sup>8</sup>Results do not rely on these parametric assumptions and are unaffected by changing the 90% threshold, or by assuming a uniform probability distribution function. Results available upon request.

<sup>9</sup>I exclude agents who earn more than 1,5 million DKK (less than 1% of all respondents), but results are robust to the inclusion of high-earning individuals. Available upon request.

around round values, a well-known finding in the literature (Dominitz and Manski 1997; Manski and Molinari 2010).

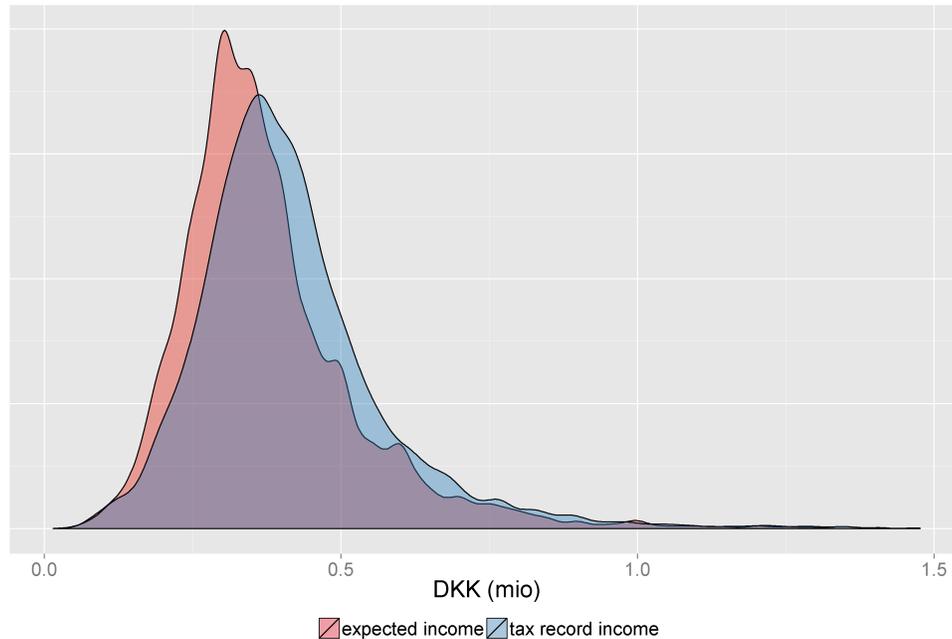


Figure 2: Density plot of expected and tax register income

Since wage income is often specified in legally binding contracts and paid on a monthly basis, one possible explanation for the left-skewedness of the expected income measure could be that respondents find it difficult to forecast more volatile income components such as capital income.

In order to investigate this in more depth, I create a variable measuring the fraction of tax register income that consists of wages. This measure is then regressed on the absolute percentage difference between tax register and expected income. Results are presented in figure 3, which reveal a clear negative relationship between the fraction of income stemming from wages and absolute forecast error. According to the estimates, increasing the wage fraction of total income from 0 to 1 is associated with a decrease in absolute forecast error of around 15 percentage points. These regressions thus confirm that forecast errors are smaller the larger the share of total income consists of wage income.

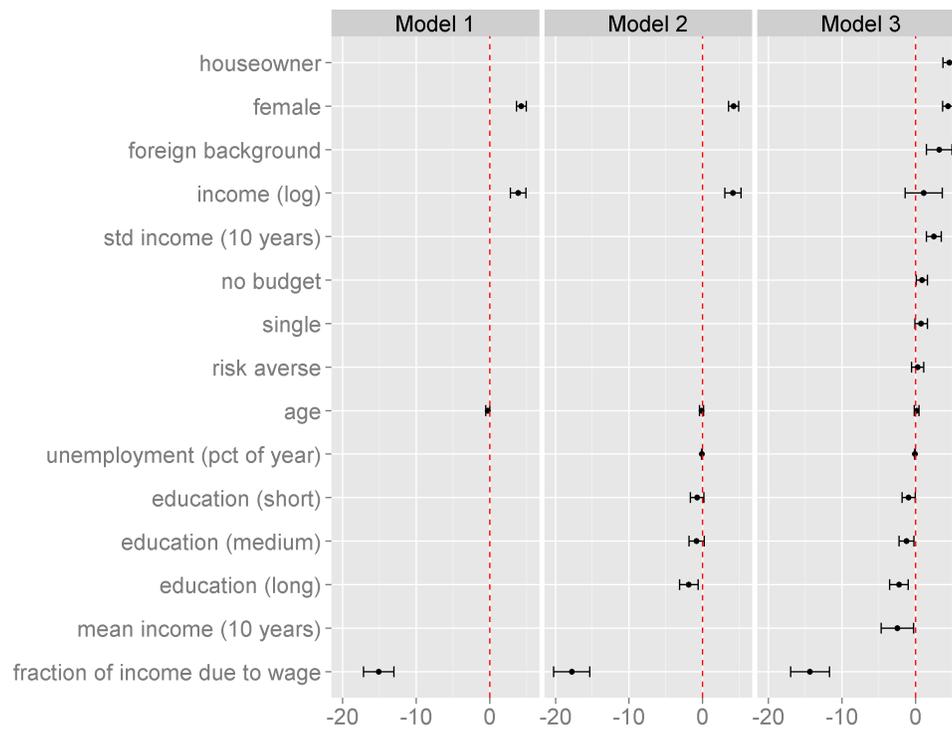


Figure 3: Coefficient plot from an OLS regression of the fraction of income stemming from wages and a set of controls on the absolute percentage difference between earned and expected income. The dots show the point estimates, along with the 95% confidence interval. Standard errors are clustered at the individual level.  $N$  ranges from 7054 to 6975 across the three models.

I proceed by investigating how much information is contained in the expected income variable. One way to evaluate this question is by looking at whether the expected income variable has predictive power beyond what information is contained in last year's income and standard controls. Figure 4 presents results from an OLS regression of (log of) *expected income* in year  $t$  and a set of covariates on (log of) tax register income in year  $t + 1$ . Results show that *expected income* is a very strong predictor of yearly realized income even when controlling for past income and a large set of register based controls. This is clear evidence that the expected income measure captures information beyond what can be modeled using only information about past earnings and standard variables known from the literature.

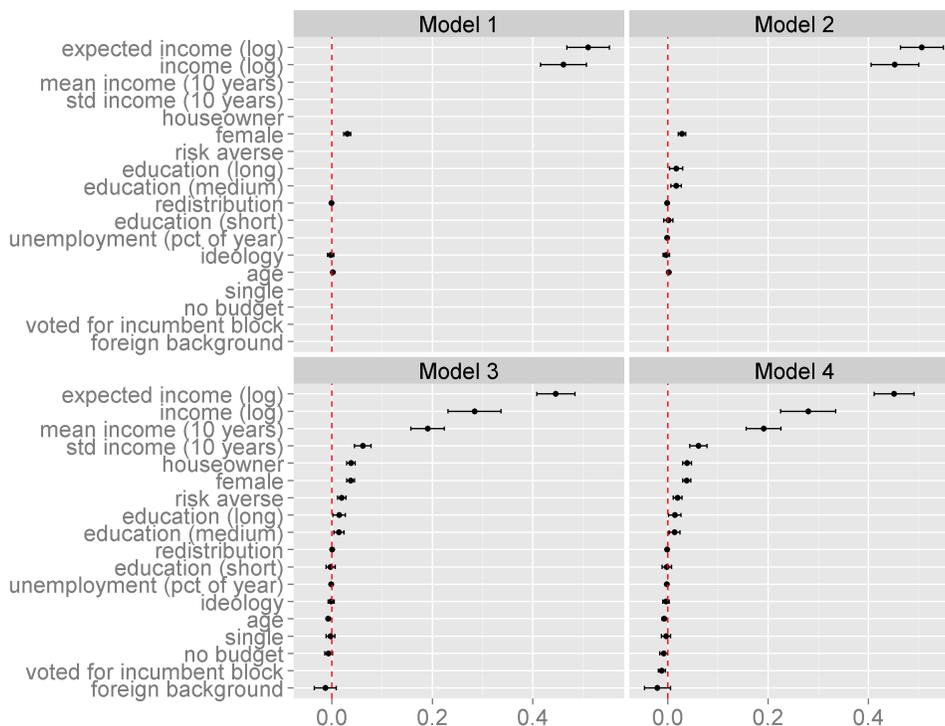


Figure 4: Coefficient plot from an OLS regression of *expected income* in year  $t$  and a set of covariates on tax register income in year  $t + 1$ . Standard errors are clustered at the individual level.  $N$  ranges from 7321 to 6855 across the four models.

Having access to merged register and survey data allows me to combine subjective information on expectations with objective, high-quality information on actual income trajectories. Figure 2 illustrates that the distribution of expected income is very similar to that of tax register income, although slightly left-skewed. The difference is increasing when a larger fraction of the respondent's total income comes from other sources than labor income. This could be explained by respondents finding it difficult to forecast volatile income sources such as capital income, or by respondents being conservative when they forecast their income. Furthermore, results from an ordinary OLS regression show expected income to be very strongly correlated with future tax register income, indicating that it contains information beyond what can be attributed to past income experiences. In the next section, I explain how subjective expectations and objective income information can be combined to create a measure of unexpected negative income shocks.

### *Defining Income Surprises*

Defining a (negative) income surprise even with the detailed information available is not straightforward. Before turning to the preferred definition two concerns should be addressed. First, one might question whether agents notice the difference between what income they expect and what is actually obtained. That is, does my measure of an income shock influence how the respondent would characterize his own income experience over the year? Second, one obvious threat to identification comes from the fact that susceptibility to income shocks could be driven by political preferences. This can be considered a particular kind of selection problem where agents self-select into negative income shocks based on political preferences. After describing how I define an income shock, I examine both of these concerns empirically. I show that my income surprise measure is a strong predictor of a respondent's own evaluation of his income experiences, and I find no evidence that negative income shocks correlate with political preferences.

The main explanatory variable in this paper, *income surprise*, is based on the percentage difference between *expected income* as defined above, and tax register income obtained from the Danish tax registers. The main focus in this paper is on negative shocks, i.e. situations where expectations about earnings in a given year exceed what income was later obtained in the marketplace. One obvious challenge is how to define the percentage threshold. In the main specifications, I work with a threshold of 7.5% (approx. 30,000 DKK on average). The threshold is chosen because it amounts almost exactly to a situation where the agent, based

on expectations, received income in 11 out of 12 months during the year. Thus, I define a (negative) income surprise for agent  $i$  in year  $t$  as a dummy taking the value 1 if the percentage difference between what the agent expected to earn at the beginning of  $t$  and what income the agent actually obtained during the year exceeds 7.5%, and 0 otherwise.

Figure 5 shows a histogram of the *income shock* variable. In order to avoid results being driven by outliers, I exclude respondents who are measured as having income shocks exceeding 50% in the main specifications, but results are even stronger when this group is included. The figure shows that the average individual earned about 10% more than expected. As mentioned above, this is not surprising since agents might be slightly conservative when forecasting income. Negative income shocks exceeding the 7.5% threshold are colored in darker blue in the histogram, and cover slightly more than 13% of all income realizations in the data. This is where a large sample size is key. Having access to a repeated sample of around 6,000 Danes allows me to investigate effects of events that are usually too small to be identified in survey-based studies.

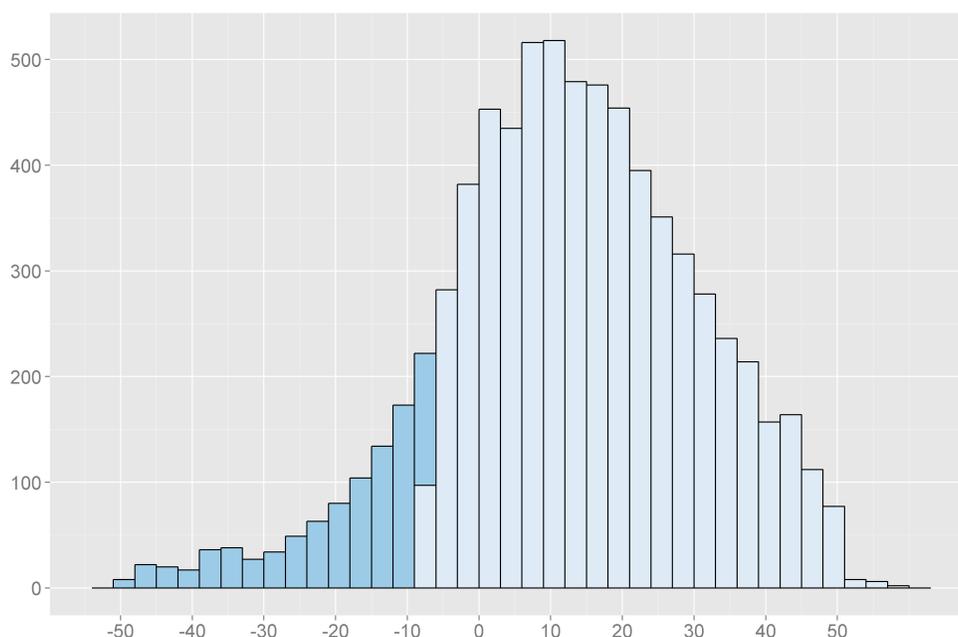


Figure 5: Histogram of income shocks. The darker blue color indicate negative income shocks as defined in the main specifications

In order to validate the surprise income measure, we ask respondents to retrospectively describe how their income developed during the year compared to their expectations at the beginning of the year. Respondents were asked to report their answer on a 5-point Likert scale ranging from 1) ‘much better than expected’ to 5) ‘much worse than expected.’ From this coding, I construct a binary variable, *self-reported income shock*, taking the value 1 if the respondent answered 4 or 5, and 0 otherwise. I then regress my *income surprise* measure (and a set of controls) on *self-reported income shock*. Figure 6 shows a coefficient plot of a standard logit regression. Several things are worth noticing. First, and most importantly, is the fact that *income surprise* is a strong and significant predictor of an agent self-reporting that his income has developed worse or much worse than expected. I interpret this as evidence that my *income surprise* measure - beyond capturing objective differences between expected and realized income - also captures a subjective belief that income has developed worse (or much worse) than expected over a given year. Second, note that the point estimate on tax register income is significant and negative. This is not surprising; holding expectations constant, we would expect agents with higher income to be less likely to report that income has developed worse than expected.

Turning attention to the second concern, namely whether political preferences correlate with the probability of experiencing a negative income shock, I proceed by estimating a logit model with *income surprise* regressed on a set of covariates of which the political variables are of particular interest.<sup>10</sup>

Figure 7 shows the results. It is immediately clear that neither *ideology* nor *redistribution* are significant in any of the specifications. This indicates that negative income shocks are not driven by the respondent’s political preferences. In addition, several interesting patterns are worth pointing out. First, agents with a more volatile income history over the last 10 years are more likely to experience a negative income shock, as are agents living in households who do not use a budget. Second, risk averse agents, women, and house owners are significantly less likely to experience negative income shocks.

Overall, I find no evidence of self-selection based on political preferences. I do, however, find that behavioral and demographic variables correlate significantly with the propensity to experience a negative income shock. These patterns are

<sup>10</sup>I have also estimated a multinomial logit model on the data split into three categories (*negative surprise*, *no surprise*, *positive surprise*) based on the 7.5% threshold, using *no surprise* as baseline. Results are indistinguishable from those of the logit model and show no correlation between the political variables and *negative surprise*. Available upon request.

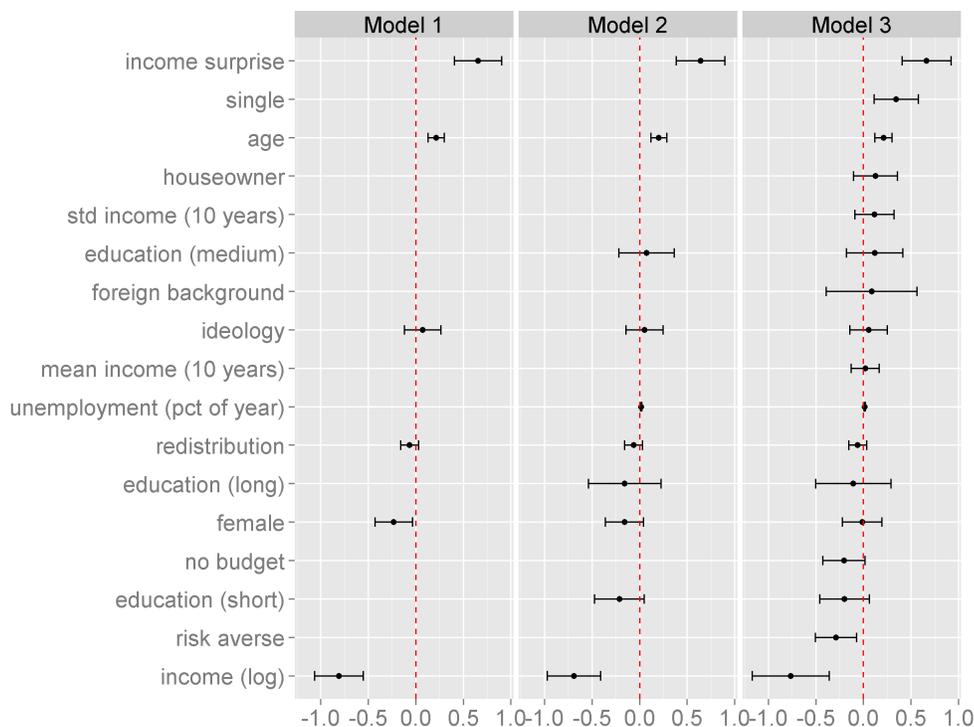


Figure 6: Coefficient plot from a logit regression of *income surprise* in year  $t$  and a set of covariates on *self-reported income shock* reported in  $t + 1$ . The dots show the point estimates, along with the 95% confidence interval. Standard errors are clustered at the individual level.  $N$  ranges from 5778 to 5719 across the three models.

important since they could in principle indicate some unknown form of self-selection (although not driven by political preferences), something I address explicitly using a matching strategy in the robustness section.

Having access to detailed register data allows me to evaluate the representativeness of the survey on key demographic variables. Figure 8 shows a density plot comparing the distribution of the respondents in the 2010-12 survey to the entire Danish adult population on age, income (mio DKK) and unemployment (in percent of the year for those who have experienced positive unemployment spells during the year). The figure reveals that the survey is indeed representative in terms of coverage of the working adult population and unemployment. However, there

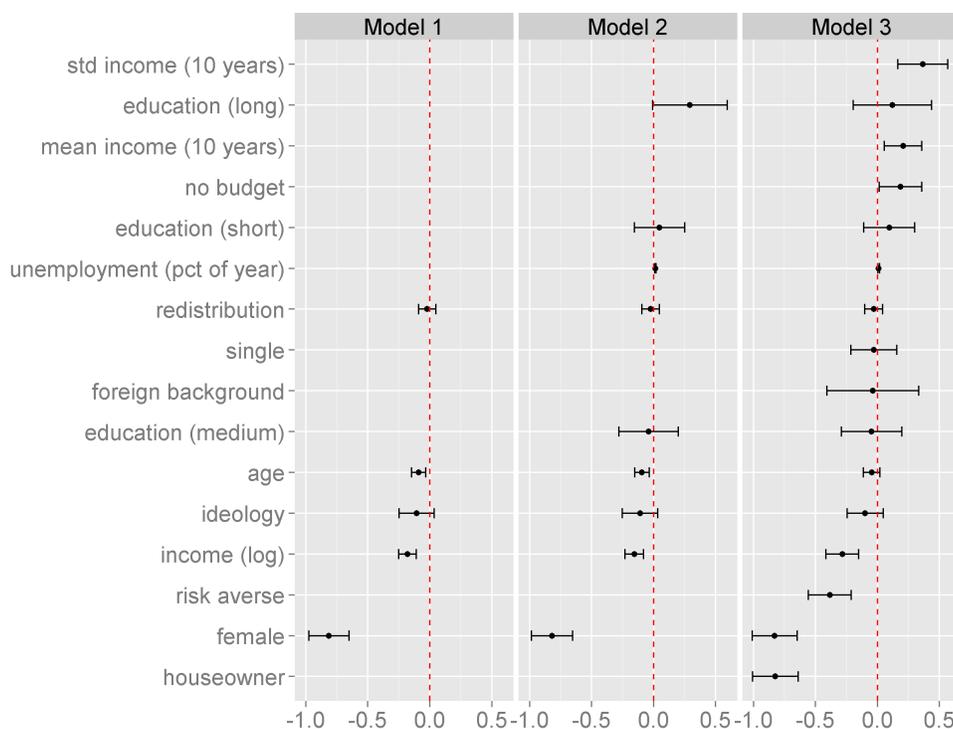


Figure 7: Coefficient plot from a logit regression of a set of covariates on *negative surprise*. Standard errors are clustered at the individual level.  $N$  ranges from 7325 to 7244 across the three models.

are clear signs that the distribution of survey-participants on income is somewhat right-skewed compared to the overall population, which might not be surprising considering the fact that retirees are clearly under sampled. The survey achieves almost complete balance on gender. Turning attention to representativeness on key political variables, it is comforting that 49,2% of the respondents report to have supported right-wing parties in the Danish parliamentary election in 2011 (they received 48,9%).

Descriptive statistics on the main variables used in the econometric model on the trimmed data are provided in the appendix. It should be noted that only 5% of respondents believe luck to be the most important factor determining success in life. Therefore, I work with a dummy variable, *ideology*, in the main specifications.



Figure 8: Comparison of the participants in the 2010-12 surveys to the adult Danish population on three key demographics. For ease of interpretation, the plot excludes observations above the 99th percentile.

This variable takes the value 1 if the agent believes luck and effort to be at least equally important in determining success in life, and 0 otherwise.

This section has outlined the construction of the main independent variable, *income surprise*. It builds on a measure of expected income constructed from survey data that is shown to mimic the distribution of realized income, and is a strong predictor of future obtained income even when controlling for past income experiences, demographic, behavioral, and political variables. The main income surprise measure is shown to be a strong predictor of whether the agent self-reports income to have developed worse than expected, and I find no evidence that agents income shocks are driven by political preferences. I do, however, find evidence that other variables such as risk aversion, whether or not the household use a budget,

and past income volatility predict whether the agent experiences an income shock as defined above. The next section outlines the econometric approach and the main results.

## 4 Investigating the Effects of Income Shocks

I analyze the effects of negative income shocks on redistributive preferences using two main dependent variables, demand for redistribution and vote intention. Since the first is an ordered categorical variable, it is estimated using the following OLS model

$$\text{redistribution}_{it+1} = \gamma \text{surprise}_{it} + \phi \text{ideology}_{it} + \omega \text{surprise}_{it} \times \text{ideology}_{it} + \theta \text{redistribution}_{it} + \beta X_{it} + \varepsilon_{it}, \quad (1)$$

where  $X$  is a set of controls to be described below. OLS is chosen for ease of interpretation, but results are robust to using ordered logit (not reported). *Vote intention* is a binary variable, and is estimated using a standard logit model.

Since we want to allow for differential effects depending on the agent's ideology, I include an interaction term between *surprise* and *ideology*.  $\gamma$  thus measures the association between a negative economic shock and demand for redistribution in period  $t + 1$ , given that the agent has a pro-market ideology.  $\gamma + \omega$  measures this association when the agent is ideologically skeptical of markets. Note that the inclusion of period  $t$  redistribution implies that the model estimates changes in individual demand for redistribution rather than the absolute level of support.

All specifications include year fixed effects, the lagged value of redistribution, and the ideology dummy. Standard errors are clustered at the individual level. In addition, specification 1 includes register based income, gender, age, and age<sup>2</sup>. Specification 2 adds further demographics such as unemployment, and education dummies (the baseline category is high-school or less). Specification 3 adds behavioral variables such as *risk aversion* and *no budget*, as well as mean and standard deviation of tax register income over the past 10 years, whether the respondent has foreign background, and whether or not the individual owns a house. Specification 4 adds information about whether the respondent supported the centre-right in the last Danish general election.

At least three factors mitigate concerns compared to previous studies that the correlations reported below are driven by omitted variable bias. First, and most importantly, is the fact that I use a combination of a repeated survey and

tax register data to isolate *unexpected* changes in income. Second, I control for deep behavioral parameters such as risk aversion, and third, I employ a precise set of register based controls, instead of relying on survey-based measures of which many suffer from non-classical measurement error.

### *Relating Income Shocks to Redistributive Preferences*

Figure 9 shows a coefficient plot of the results of estimating the equation described in (2) on demand for redistribution. Model 1 shows the minimal specification with only few control variables. The figure reveals an interesting asymmetric effect of income shocks depending on ideological beliefs. There is a sizable negative effect of experiencing a negative income shock for respondents who hold pro-market beliefs. On the other hand, I find no evidence that respondents who are ideologically skeptical of markets change their demand for redistribution (the sum of  $\gamma$  and  $\omega$  is statistically insignificant across all models). The point estimates of the control variables mimic those previously found in the literature (Alesina and Giuliano 2009): respondents who believe personal success to be the result of luck rather than effort consistently demand higher redistribution, as do women, and preferences over redistribution are highly persistent as could also be seen from figure 1. Furthermore, expected increases in income decreases demand for redistribution. Models 2 and 3 add a set of demographic and behavioral control variables. This has little effect on the main parameters of interest: negative income surprises are significantly related to decreased demand for redistribution for market conformists, but are insignificant for market skeptics. It should be noted that including the control variables completely eliminates the significance of income that was expected by the agent in the beginning of the year. This indicates that only unexpected changes in income are related to changes in demand for redistribution, supporting the conjecture that preferences over redistribution are forward looking and updated to reflect future income streams. There is no evidence that lifetime income or past income volatility relate significantly to changes in demand for redistribution. Model 4 adds a vote dummy for whether or not the respondent supported the centre-right government in the last Danish general election. As expected, there is a strong correlation between low demand for redistribution and supporting the centre-right in Denmark. This illustrates that first dimension politics dominate in Denmark as is the case in many other countries (McCarty, Poole, and Rosenthal 2006). Adding past voting history does not change the overall conclusions regarding the income surprise variable.

From a policy stance, one might be interested to know whether income shocks

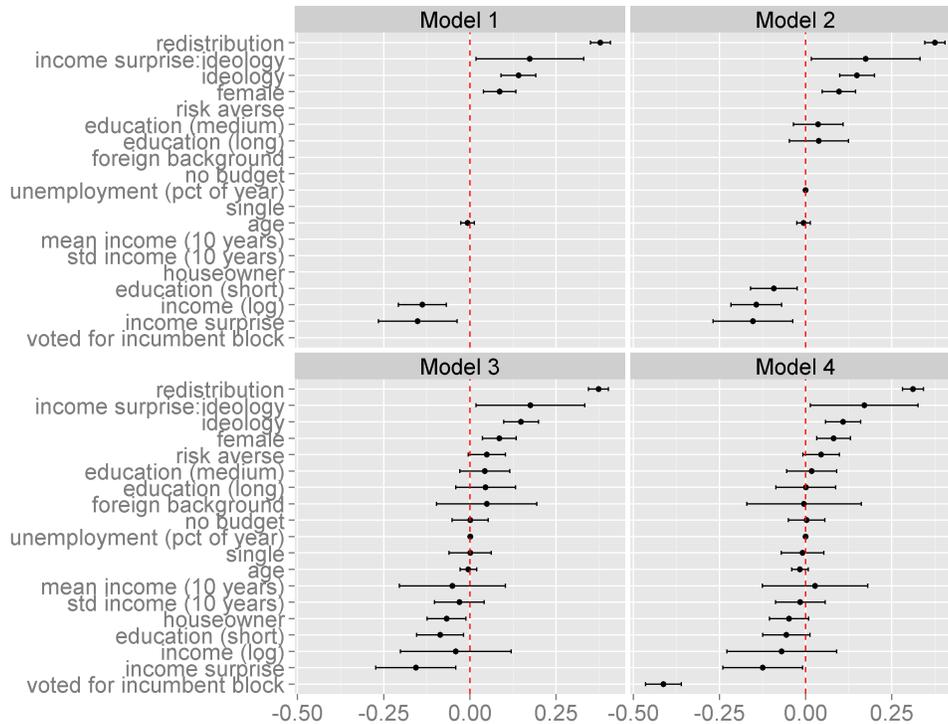


Figure 9: Coefficient plot from an OLS regression of *income surprise* on redistribution in period  $t + 1$ . Standard errors are clustered at the individual level.  $N$  ranges from 5783 to 5448 across the four models.

affect not only demand for redistribution, but also the distribution of votes for parliament. To investigate this question, I use the variable, *vote intention*, which takes the value 1 if the respondent intends to vote for the centre-right in the next general election, and 0 otherwise. Since Denmark held a general election in late 2011, I lose one wave of data compared to previous regressions.<sup>11</sup> Figure 10

<sup>11</sup>The fact that there was a Danish parliamentary election in September 2011 is both a curse and a blessing. Obviously, it creates a break in the data series. On the other hand, it allows me to validate the intent to vote variable by correlating this variable measured in January 2011 with self-reported vote in January 2012, only three months after the election. I find that 72% of the respondents report to have voted for the party that they intended to vote for in the beginning of the year according to the survey, and intent to vote is a very strong predictor of self-reported vote

reports the results of a logit regression using the same set of controls (except year dummies). Results are qualitatively indistinguishable from those estimating demand for redistribution. Importantly, negative income shocks are associated with an increase in the probability that a market conform respondent intends to support the centre-right coalition, whereas I find no significant effects for voters who are ideologically skeptical of markets. These findings indicate that unexpected income shocks do indeed influence election outcomes.

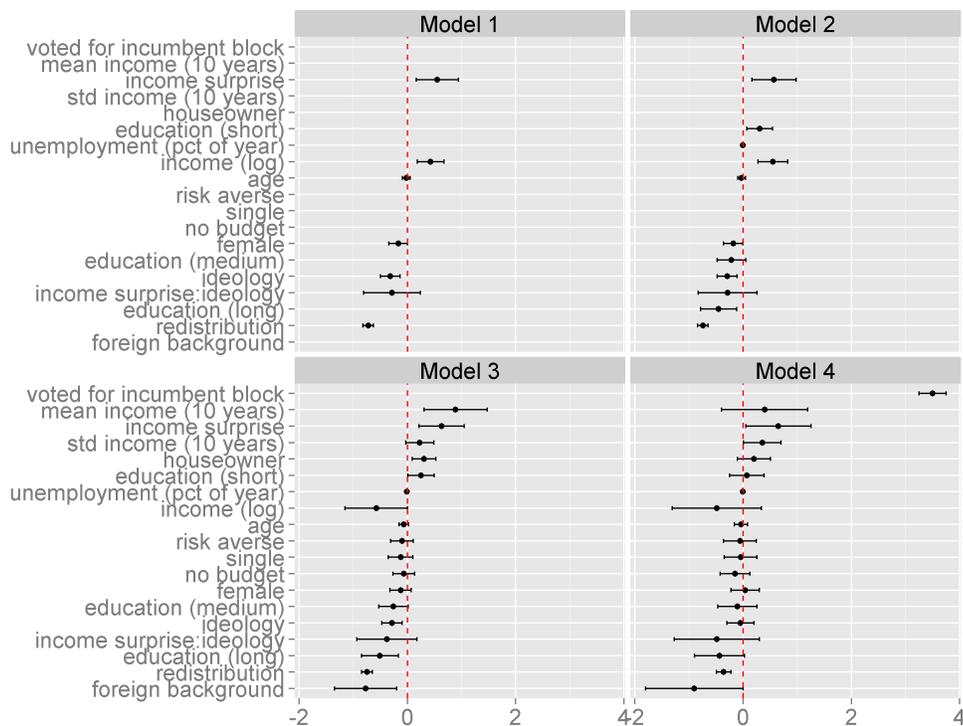


Figure 10: Coefficient plot from a logit regression of *income surprise* on the probability of voting for centre-right parties. Standard errors are clustered at the individual level.  $N$  ranges from 2558 to 2445 across the four models.

Figures 9 and 10 document that unexpected income surprises are significantly related to changes in demand for redistribution and the propensity to vote for the  
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 in a regression with standard controls.

centre-right in an interesting asymmetric way: unexpected decreases in income are negatively related to demand for redistribution for right-wing voters, whereas I find no evidence of an effect for left-wing individuals. I also find no evidence of a significant effect of expected changes in income. This suggests that voters base their stated preferences for redistribution and their voting decision on expected future income realizations. This results might help explain why the literature thus far find inconclusive evidence relating income to demand for redistribution (Alesina and Giuliano 2009; Fong 2001). In the next section, I investigate the robustness of these results.

### *Robustness*

How confident can we be that unexpected income shocks affect demand for redistribution? The combined survey and register data allows me in a novel way to isolate *unexpected* changes in individual income. Furthermore, careful attention is paid to creating precise register and survey based control variables. This strategy implies that concerns of omitted variable bias are significantly diminished. To further increase confidence in the identification strategy, this section subjects the main results to a battery of robustness tests. As a first test, I examine the robustness of the main results to the chosen 7.5% shock threshold. I use the most demanding specification including both demographic, behavioral, and political controls (model 4 in the plots reported above) and let the shock threshold run from a shock of 1% to a shock of 15%. Figure 11 shows the results for redistribution, and figure 12 the probability of voting for the centre-right parties. The first figure shows the point estimates to be relatively stable across the interval, with standard errors increasing somewhat as the effect is estimated on a smaller proportion of the sample.

Figure 12 shows a clearer picture as the probability of voting for the centre-right is strictly increasing in the size of the economic shock. The effect is precisely estimated, and the interaction effect for market skeptics is never significantly different from zero across the size of the shock. Overall, I find that the main substantive effects reported in this paper are robust to varying the size of the unexpected income shock, although the effects are estimated on a smaller proportion of the data, leading to increased standard errors.

One might also worry that a ‘ceiling effect’ could drive results. It could be the case that left-wing respondents increase their demand for redistribution, but since a fraction of these respondents have already reported the max level of redistribution, they have no room to report increases in their demand. To explore this

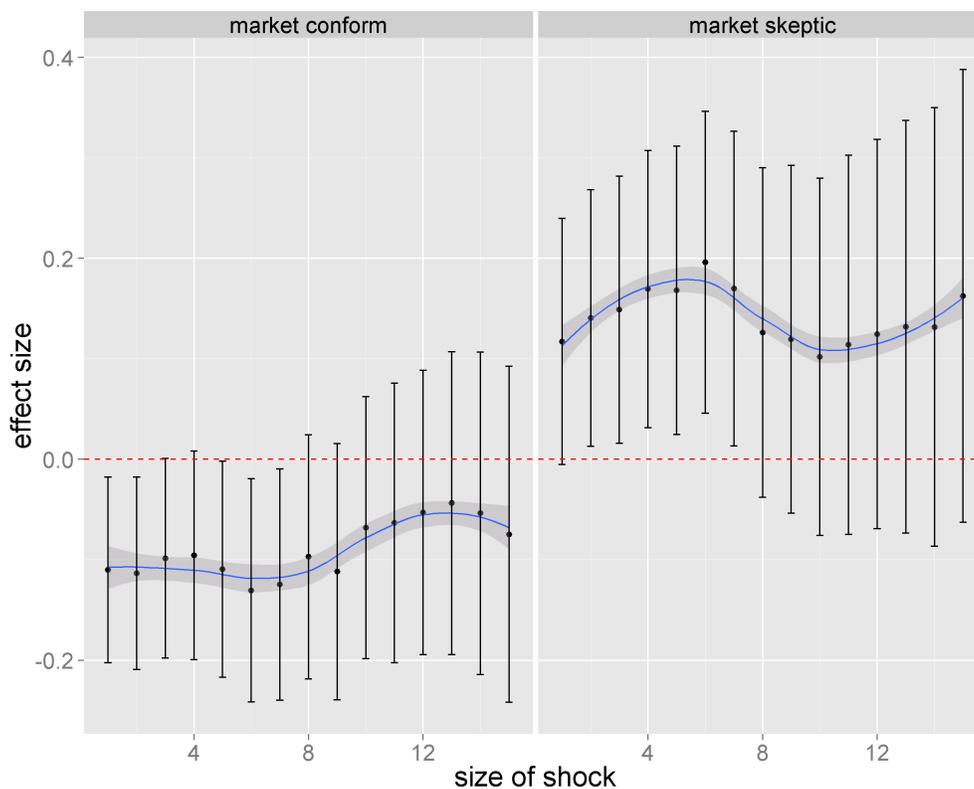


Figure 11: Coefficient plot from an OLS regression of *income surprise* on redistribution in period  $t + 1$  as a function of the size of the unexpected income shock. Standard errors are clustered at the individual level.

possibility, I exclude respondents who placed themselves at the extremes of the redistribution scale (i.e respondents who answered 1 or 5) in period  $t$ . The sample now only includes respondents who are able to report changes in their demand for redistribution. I then reestimate equation (2). Results are presented in figure 13. Removing this group has little effect on the overall results. The point estimates are very similar to those in the unrestricted model, although the standard errors are slightly larger (which is little surprise as the sample size has decreased).

At last, I address the fact that the assignment of income shocks was shown to be nonrandom. Specifically, figure 7 showed this to be correlated with both behavioral and demographic variables. I address this issue by pre-processing the dataset using a matching technique as recommended by Ho et al. (2007). The purpose is

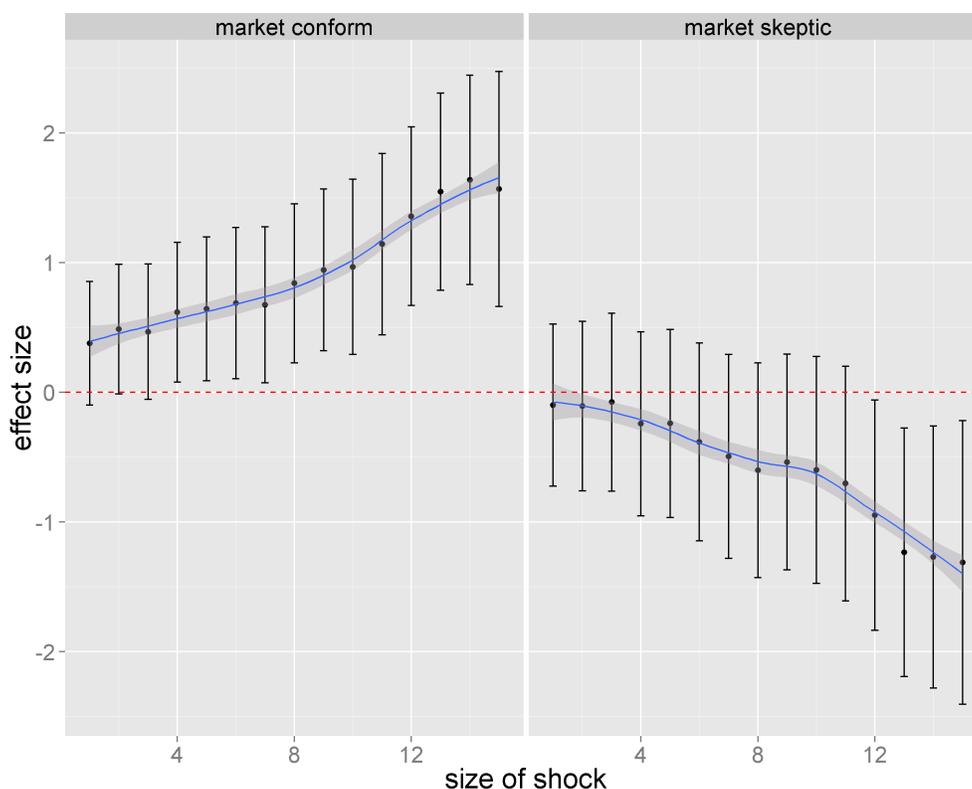


Figure 12: Coefficient plot from a logit regression of *income surprise* on the probability of voting for centre-right parties as a function of the size of the unexpected income shock. Standard errors are clustered at the individual level.

to create a sample of the data in which the difference between respondents who experienced an income shock and respondents who did not is reduced. Since matching rarely completely eliminates the difference between the two groups (due to what one might interpret as an example of the curse of dimensionality), I adjust for remaining imbalances using the OLS regression described in equation (2). I match on all the covariates used in the regression (except ideology which is explicitly accounted for by interactions in the regression).<sup>12</sup> Results from the

<sup>12</sup>In practice, I use a one-to-one nearest neighbor matching algorithm with replacement to obtain the matched sample. The algorithm was implemented in R using the *GenMatch* package (Sekhon 2011) which uses a genetic search algorithm to determine the weight each variable should receive in order to achieve optimal balance (Diamond and Sekhon 2013).

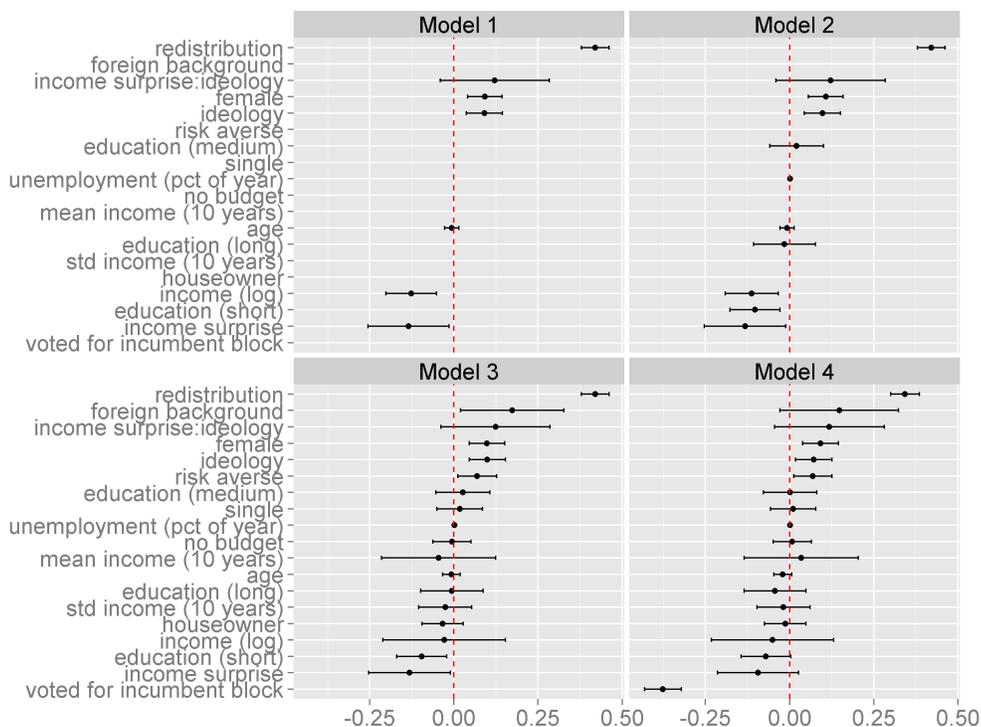


Figure 13: Coefficient plot from an OLS regression of *income surprise* on redistribution in period  $t + 1$  when removing respondents at the extreme ends of the redistribution scale. Standard errors are clustered at the individual level.  $N$  ranges from 4578 to 4305 across the four models.

model with all controls are presented in figure 14. Controlling for nonrandom assignment has little effect on the main parameter estimates of interest, and I find no evidence that nonrandom assignment drives the results.<sup>13</sup>

<sup>13</sup>I have also explored a Placebo-type specification where unexpected income shocks are regressed on *past* changes in demand for redistribution. I find no significant effects at any standard significance level. Available upon request.

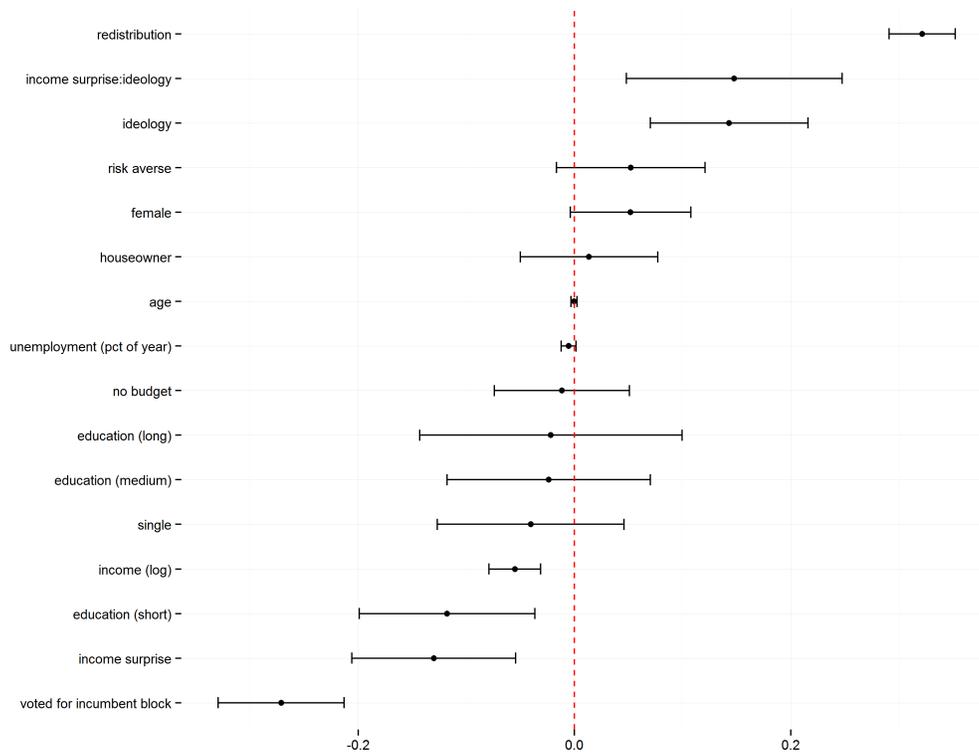


Figure 14: Coefficient plot from an OLS regression of *income surprise* on redistribution in period  $t + 1$  on the matched dataset.

### *Investigating the Link between Ideology and Redistribution*

The previous section documented two robust findings. First, only unexpected negative income surprises seem to correlate with changes in demand for redistribution and the propensity to vote for the centre-right. Second, there is clear evidence of an interesting asymmetry; the effect is sizable and consistently significant for market conformists, but the point estimates are much smaller, and are never close to significance for individuals who are ideologically skeptical of markets. One possible mechanism for this asymmetry is ideological switching by certain respondents. That is, some respondents might challenge their ideological beliefs in light of a negative economic shock. In this section, I provide evidence that unexpected negative income shocks causes ideological switching for agents

who are most skeptical of markets, but has no effect on the ideological views of other respondents. The fact that some ideologically skeptical agents become more pro-market after experiencing a negative income shock could help explain why we observe no overall effect on demand for redistribution for this group.

In order to investigate the effect of negative income shocks on ideological beliefs, I let the *ideology* variable take the values 1 (effort most important for success) through 3 (luck most important for success). I now estimate an OLS model very similar to that in the previous section

$$\begin{aligned} \text{ideology}_{it+1} = & \gamma \text{surprise}_{it} + \phi \text{ideology}(==2)_{it} + \omega \text{surprise}_{it} \times \\ & \text{ideology}(==2)_{it} + \alpha \text{ideology}(==3)_{it} + \kappa \text{surprise}_{it} \times \\ & \text{ideology}(==3)_{it} + \theta \text{redistribution}_{it} + \beta X_{it} + \varepsilon_{it}. \end{aligned} \quad (2)$$

The baseline is an agent who holds a pro-market ideology. The same control variables are used as in the previous section. A negative point estimate implies that the respondent is becoming more pro-market in his ideological beliefs. The results are presented below.

Figure 15 shows several interesting results. First, there is clear evidence of a large degree of persistence in the ideology variable. This is comforting since the ideology variable is meant to capture relatively stable political beliefs that should be slowly moving over time. Second, I find no evidence that a negative income shock is at all correlated with ideological beliefs for agents who hold a pro-market ideology. The point estimate is very close to zero, and is nowhere near significant in any of the specifications. There is weak evidence of a small effect for agents who are moderately skeptical of markets; the point estimate is negative, indicating that they become slightly more pro-market after experiencing a negative income shock, but the standard errors are relatively large, making the effect insignificant across the specifications. This is no longer the case if we turn attention to the agents who are ideologically most skeptical of markets. There is a clear negative relationship between a negative shock and a change in ideological beliefs, and the effect is significant across the specifications even with the large error bands around the estimates (this is most likely caused by the small number of respondents who fall into this ideological category). These regressions thus indicate a second interesting asymmetry: negative income shocks show no statistical correlation with changes in ideological beliefs for agents who hold pro-market beliefs, but a strong and statistically significant effect for agents who are most skeptical of markets. I find

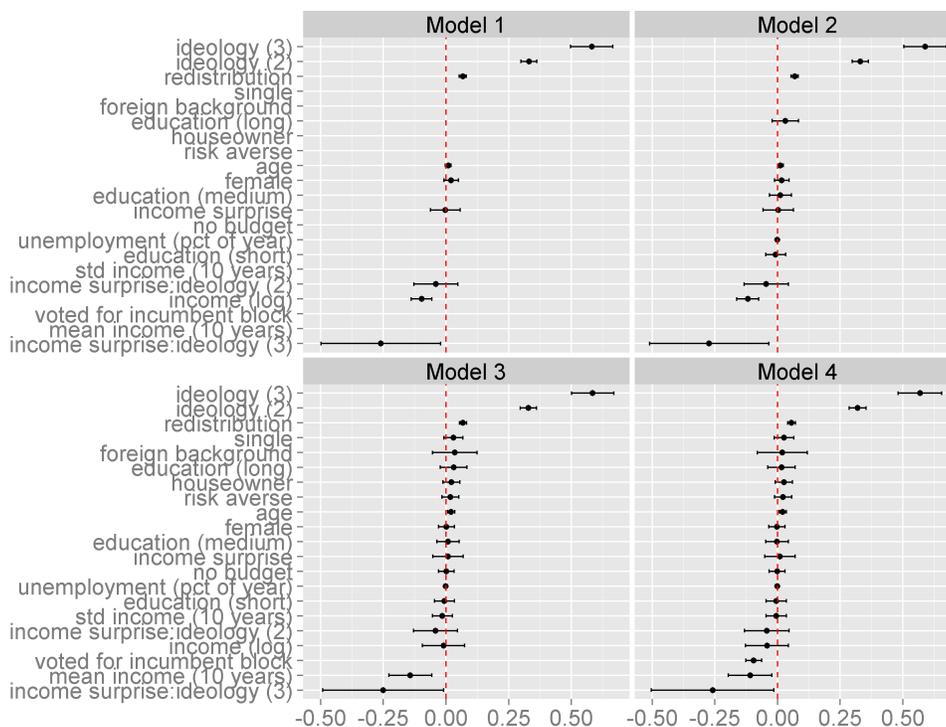


Figure 15: Coefficient plot from the OLS regression of *income surprise* on ideology measured on a 3 point scale in period  $t + 1$ . Standard errors are clustered at the individual level.  $N$  ranges from 5755 to 5423 across the four models.

evidence that a negative income shock is associated with a turn toward more pro-market beliefs for this latter group.

## 5 Conclusion

In this paper, I study the short-run effects of negative income shocks on preferences for redistribution during the Great Recession. This paper argues for a central role of expectations, which so far have not received much attention in the empirical political economy literature. Using a novel dataset that merges a repeated survey conducted during the financial crisis of 2010-12 with high-quality administrative data, I am able to construct a measure of the respondent's subjective expectation

over income during the year. I find this measure to closely mimic the distribution of realized income, and to be a strong predictor of yearly earnings in a regression framework. I use the high-quality registers to construct a measure of negative income shocks, i.e. situations where expectations over income during the year exceed what is later realized in the marketplace. I find this measure to be a strong predictor of respondents self-reporting that their income have developed worse than expected when interviewed one year later, indicating that the measure of unexpected income shocks employed in this paper - beyond capturing objective differences between expectations and tax register income - also captures a subjective belief that earnings have been disappointing compared to what was expected in the beginning of the year.

The empirical analysis reveals that unexpected negative income shocks are strongly related to decreases in demand for redistribution, but only among agents who are ideologically pro-market. I find no significant effects for respondents who are ideologically skeptical of markets. These results are consistent across a wide range of specifications and using an extensive set of precise register-based controls, as well as a battery of robustness checks. In addition, I provide indicative evidence that negative income shocks cause left-wing respondents to change their ideological beliefs in favor of more pro-market views. These findings thus corroborate recent studies using U.S data, indicating that negative macroeconomic shocks cause respondents to be more selfish in experimental games (Fisman, Jakiela, and Kariv 2013, 2014).

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*Appendix: Question Wording and Summary Statistics*

	<b>Question Wording</b>	<b>Categories</b>
max income	Think about your income for this year. What is the maximum income you would realistically expect to earn this year?	Numerical answer
min income	Think about your income for this year. What is the minimum income you would realistically expect to earn this year?	Numerical answer
probability	What is the probability that your income this year will be less than X?	Numerical answer between 0 and 100
self-reported income shock	Was your total income last year different from what you expected in the beginning of the year?	1-5
redistribution	Some people think that the government should do all it can to raise living standards for poor Danes; they score 1 on the scale. Others think that this is not the responsibility of the government and that individuals should support themselves; they score 5 on the scale. Where would you place yourself?	1-5
ideology	Some people think that success requires hard work; they score 1 on the scale. Others think that it is mostly a question of luck or connections; they score 3 on the scale. Where would you place yourself?	1-3

	<b>Question Wording</b>	<b>Categories</b>
supported right-wing	Which party did you vote for in the latest parliamentary election?	Indicator variables for each party
vote intention	Which party would you vote for if there was a parliamentary election tomorrow?	Indicator variables for each party
risk averse	Imagine yours is the only family income and you have to choose between two jobs. One guarantees your current income for life; the other gives you a chance at more but is less certain. There is a 50% probability that the second job will double your total income, and a 50% probability that it will reduce it by 1/3. Which job do you take?	Binary
no budget	Do you, or someone in the household, plan your expenses, for example by using a budget?	Binary

Statistic	N	Mean	St. Dev.	Min	Max
redistribution	7,390	3.40	1.04	1	5
income	7,391	4.03	1.57	-10.64	14.56
female	7,391	0.51	0.50	0	1
age	7,391	43.64	10.44	22	65
education (short)	7,309	0.46	0.50	0	1
education (medium)	7,309	0.23	0.42	0	1
education (long)	7,309	0.11	0.32	0	1
unemployment (pct of year)	7,391	2.71	10.74	0.00	92.90
risk averse	7,390	0.76	0.43	0	1
no budget	7,390	0.29	0.45	0	1
homeowner	7,391	0.65	0.48	0	1
single	7,391	0.21	0.41	0	1
foreign background	7,391	0.04	0.20	0	1
mean income (10 years)	7,391	3.16	1.27	-1.08	14.51
std income (10 years)	7,391	0.90	0.55	0.10	12.57
income surprise (5 pct)	7,388	0.15	0.36	0	1
income surprise (7.5 pct)	7,388	0.13	0.33	0	1
income surprise (10 pct)	7,388	0.10	0.30	0	1
voted for incumbent block	6,987	0.49	0.50	0	1
ideology (effort)	7,391	0.45	0.50	0	1
ideology (equally important)	7,391	0.50	0.50	0	1
ideology (luck)	7,391	0.05	0.22	0	1

Table 1: Summary Statistics. Income variables measured in 100,000 DKK.