Appendix with Supplementary Material for:

The Consumption Expenditure Response to Unemployment: Evidence from Norwegian Households

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A Institutional setting

A.1 Job termination and prior notice

In Norway, the rules for terminating a job relationship are considered strict (Addison and Teixeira, 2003) and are governed by the Working Environment Act ("Arbeidsmiljøloven"). The employer must provide a solid and just cause for the termination for it to be legally binding, and terminations are frequently challenged in court. Generally, downsizing is considered a just ground for termination, as well as a few performance-related reasons. For terminations not related to downsizing, the employee must deliver performance and results that over time are clearly sub-standard, or otherwise show neglect, misconduct, or lack of loyalty to such an extent that it is objectively clear that the employment should be terminated. If the firm is considering laying off ten workers or more for non-individual specific reasons, it is obligated to discuss the layoff, the choice of employees to be let go, and possible severance payments with employee representatives (typically the local divisions of the labor unions). The Working Environment Act sets deadlines for when employees should be notified that they will be laid off, and the notification period depends on job tenure, and in some cases age. Workers employed for less than 5 years should be notified at least 1 month in advance, 2 months if employed between 5 to 10 years, and for workers employed for 10 years or more the period of notice is 3 months.Workers above 50 (55) years old, with job tenure of at least 10 years, have a period of notice of 4 (5) months. For workers in a trial period, the period of notice is 14 days. For public employees, the period of notice is somewhat longer: One month if the employment has lasted less than a year, three months if the employment has lasted more than a year, and six months if the employment has lasted more than two years. There are very few public employees in our final sample.

When an employer plans to lay off ten employees or more over the span of one month, and the decision is guided by circumstances outside of the work performance of the employees, they have to do what they can to avoid the layoff, including finding alternative work within the firm if possible and to mitigate the strain that unemployment puts on the fired employees. Employee representatives need to be consulted and informed about the decision, its justification, possible severance payment, and which criteria guide the layoff decision. Only in cases of serious

Table A1: Period of notice for employees in the private sector, by tenure and age of employee

	in trial period	< 5 years	$5 - 10$ years	> 10 years
younger than 50	14 days	1 month	2 months	3 months
$50 - 54$ years	14 days	1 month	2 months	4 months
$55 - 59$ years	14 days	1 month	2 months	5 months
60 or older	14 days	1 month	2 months	6 months

Table A2: Period of notice for employees in the public sector, by tenure

	< 1 year	$1 - 2$ years	> 2 years
Period of notice	1 month	3 months	6 months

misconduct can the employee be laid off with immediate effect. The reason why an employee is laid off is not observable in the administrative data we use in the analysis.

A.2 Unemployment benefits

To be eligible for unemployment benefits you must have been employed for at least one year and earned above the minimum requirement. The minimum requirement is 1.5 times the basic amount over the last 12 months or more than 3 times the basic amount over the last three years. The basic amount is a monetary measure used by the social security administration to calculate various sets of transfers and benefits. It is adjusted each year according to the wage growth in the economy. In 2017 the basic amount was 93,634 NOK (11,332 USD). Eligible unemployed receive unemployment benefits equal to 62,4 percent of previous income, before tax. The amount will be somewhat higher if the unemployed have children they provide for; a small amount (17 NOK, just above 2 USD, in 2018) is added for each child for each workday spent as unemployed. Business income, pensions, and income above 6 times the basic amount are not taken into consideration.

An individual may be full-time or part-time unemployed. You will be considered part-time unemployed if your employer reduces your position by 50% or more. Both full-time and part-time unemployed are entitled to unemployment benefits, and benefit payments to part-time unemployed are reduced proportionally to the number of hours they continue working during unemployment (relative to a standardized work week of 37.5 hours). Further, both involuntary unemployed and individuals who quit their job are entitled to unemployment benefits. However, if you quit your job you will have to wait a certain number of weeks before you are eligible for benefits. In 2018 this number is 12 weeks, but was 8 weeks in our sample period. Involuntarily unemployed have to wait only three days. To receive unemployment benefits the unemployed worker has to register with the labor and welfare administration, report every 14th days, and may be subject to job search-related requirements. When registered as unemployed one must be actively searching for

a job and willing to take any job offered to them, even if it requires relocation of the household.[26]

An unemployed individual can only receive unemployment benefits for a period of 104 weeks[27]. If they become unemployed again at a later point in time they would be eligible for another 104 weeks of unemployment benefits, conditional on meeting the income requirements.

A.3 Other welfare benefits

Workers who are deemed by their doctor to be too sick to work are entitled to sickness benefits with 100% replacement rate. A worker can be on full-time or part-time sick leave, and the reduction in work hours is determined by their doctor. Disability benefits are paid to eligible workers who are permanently unable to work for various health reasons. Also here, the reduction in work hours can be part-time or full-time, but the replacement rate is less than 100% and depend on previous income history and age. Disability benefits are decided by NAV after a recommendation from a doctor.

B Data

The data applied in the analysis is Norwegian tax and employment registers, covering every Norwegian resident from 1993-2015. All data is third-party reported and collected for tax purposes. There is little or no measurement error, and rarely missing data points.

The Norwegian tax authorities collect information about wealth and income. Wealth data is reported by asset class (Financial: deposits, mutual funds, listed stocks, non-listed stocks, debt, and more. Real: housing, cars, vacation homes, boats, and more) and income data is grouped by income source (labor income, capital income, interest paid and interest earned, and business income). In addition, the dataset contains information about all government transfers, both taxes and monetary welfare benefits (unemployment benefits, parental leave support, sickness benefits, social security payments, pensions, and more).

The Norwegian Labour and Welfare Administration ("NAV") administers all welfare payments, including unemployment benefits. They keep a registry of everyone who registers as unemployed, including information on application dates, actual payments of UI, benefit categories, and return to employment. The Labour and Welfare Administration also keeps a registry of all employer-employee relationships. In addition to start- and end-dates, the registry contains information about the employer (mainly industry, through a four-digit code: NACE), and, in the

[26] There are some exceptions: being older than 60 years old, having poor health, or being responsible for the care of a child will allow you to turn down a job offer in another part of the country without losing access to unemployment benefits. The unemployed can also turn down jobs that do not satisfy official safety requirements and requirements about the working environment, jobs offering provision-based salary, or jobs paying significantly less than the norm (or the collective agreement if applicable).

[27] If taxable income before unemployment was at least 2 times the basic amount. If taxable income was less than that, payment of unemployment benefits is limited to 52 weeks.

more recent years in the sample, details about the employer employee-relationship (such as average hours worked during a week). Additionally, the registry can be used to infer the number of employees in each firm, tenure, and age of the firm. As we do not have employer-employee data before 1993, the measure of tenure and firm age is limited to employment starting in 1994 or later, and firms established in 1994 or later.

Both registries keep track of individuals using a unique identification key assigned to the individual at birth. Further, the tax authorities keep a registry of marriage and cohabitation (cohabiting couples have to register if they own property, are previously married, or have a child together), allowing us to follow individuals, and couples, over time.

Finally, the unique identification key allows us to easily add additional data. We include information about education (field and level, through a six-digit code: NUS2000) and parenthood.

C Imputed consumption expenditure

As in any empirical study on household consumption dynamics, obtaining access to high-quality consumption expenditure data is essential, but also notoriously difficult. A well-proven approach in the literature has been to rely on household surveys to study household consumption behavior (see for instance e.g. Johnson et al. 2006 using the Consumer Expenditure Survey in the US or Jappelli and Pistaferri 2014 the Italian SHIW). Such surveys are advantageous in that one can obtain direct measures of self-reported consumption or propensities to consume out of hypothetical income shocks. However, they also have shortcomings stemming from small sample sizes, attrition, and measurement error in the recall and potential correlation of these with unobserved characteristics (Meyer et al., 2015).

We follow Fagereng and Halvorsen (2017) and Eika et al. (2020) in imputing consumption expenditure from Norwegian administrative data on income and wealth.[28] Consumption expenditure is calculated as income net of savings, and the main challenge in the approach is to construct a measure of "active" saving in each period. Exploiting the panel dimension of the data, we can impute active saving from the change of wealth from one year to the next, by making some assumptions about the rate of return on the household's wealth position: Listed stocks are assumed to have a rate of return equal to the return on the Oslo Stock Exchange Benchmark Index (OSEBX), and mutual funds are assumed to have a rate of return equal to the weighted sum of of 0.7 times the OSEBX and 0.3 the MSCI World Index. Interest earned on deposits and interest paid on debt are directly observable in the data. We also observe housing market transactions and include calculated net purchase of housing in the imputation equation.

[28] See also Browning and Leth-Petersen (2003) and Kreiner et al. (2014) using Danish data, and Koijen et al. (2015) and Kolsrud et al. (2020) using Swedish data.

The following equation is used to impute consumption expenditure:

$$ConsumptionExp_{i,t} = IncomeAT_{i,t} - \sum_{k \in K} \left(a^k_{it} - (1 + r^k)a^k_{i,t-1}\right) - \left(b_{i,t} - b_{i,t-1} - R^b\right) + \left(d_{i,t} - d_{i,t-1} - R^d\right) - NetHousingPurchase_{i,t}$$

where i denotes household, t denotes calendar year and K is the set of asset classes (deposits, listed stocks, mutual funds), deposits is denoted by $b_{i,t}$, and debt is denoted by $d_{i,t}$. The rate of return on asset k is r^k. Note that interest paid (R^d) and interest earned (R^b) is directly observable in the data.

To limit the measurement error resulting from this procedure we follow a number of steps suggested by the previous literature.[29] First, we exclude households in the year of household formation or dissolution, as there are significant intra-year movements of wealth related to these events. Second, we exclude household-year observations where the households are observed to own private businesses or farms, as both balance sheet components (non-listed stocks and farm equipment) and income streams from these activities are poorly measured in the data.

Another source of measurement error may stem from the assumption that all stocks and all mutual funds have the same rate of return, and follow the OSEBX. Recent work by Baker et al. (2022), using brokerage account data, shows that this type of measurement error is small and has a mean of zero across the population. The bias is more severe among the top 1%, but this group of the population is largely left out of our sample.[30]

D Labor market risk

Perceived labor market risk is one of the factors households take into account when making their consumption and saving decisions. In this section, we identify which variables are key to predicting job loss one year into the future using a probit regression model.

We estimate unemployment risk using a data set containing all employer-employee relationships from 1993-2015, merging it with additional information about the employee and the employer. As we consider only a subset of the unemployed individuals in our analysis—male workers in a stable relationship with no unemployment spell the last four years—there is a concern that these workers have chosen jobs with lower than average unemployment risk. Therefore, we limit the sample of employer-employee relationships to male workers who fulfill the sample selection criteria laid out in Section 2.3, except for the condition that they register as unemployed. Employer-employee relationships shorter than 120 days are excluded from the analysis as they are

[29] See Fagereng and Halvorsen (2017), Eika et al. (2020) and Baker, Kueng, Meyer and Pagel (2022) for a more detailed discussion of these considerations.

[30] We have also verified that our analyses do not depend on these assumptions by redoing analyses on a set of households that do not hold stocks or mutual funds. In this "no-risky-asset"-sample the measurement error should be non-existent as interest earned (paid) on deposits (debt) accounts are observed directly in the data. See also Fagereng et al. (2021) for a similar exercise.

likely to be short-term engagements and uninformative about the probability of unemployment for long-term employees. We also exclude self-employment, and individuals that have several jobs with different employers. These individuals typically work very few hours per week for each employer and are unlikely to be informative about the probability of unemployment for full-time employees. Finally, we require that the employer-employee relationship has ended less than 365 days before registration as unemployed.

Our estimation model is specified in equation 6. The dependent variable $D_{i,j,t+1}$ is a dummy variable indicating whether or not individual i working in firm j in year t registers as unemployed in year $t+1$. The probability of unemployment is assumed to be a function of a large set of control variables including tenure, firm age, sector, and education level, and is specified as follows:

$$\begin{aligned} D_{i,j,t+1} = \Phi\Big(& \sum_{k=1}^{18} \beta_1^k Tenure_{i,t}^k + \sum_{f=1}^{18} \beta_2^f FirmAge_{j,t}^f + \sum_{s \in \mathbb{S}} \beta_3^s Sector_{j,t}^s + \sum_{e \in \mathbb{E}} \beta_6^e Education_{i,t}^e \\ & + \sum_{k=1}^{18} \sum_{s \in \mathbb{S}} \beta_4^{k,s} Tenure_{i,t}^k \cdot Sector_{j,t}^s + \sum_{e \in \mathbb{E}} \sum_{s \in \mathbb{S}} \beta_5^{e,s} Education_{j,t}^f \cdot Sector_{j,t}^s \\ & + \mathbb{Z}'_{j,t}\gamma + \mathbb{X}'_{i,t}\gamma + \varepsilon_{i,t} \Big), \end{aligned} \quad (6)$$

where $\Phi(\cdot)$ is the cumulative normal distribution. To keep the estimation non-parametric, all variables are included as a set of dummy variables (except age which is a fourth-order polynomial). We include 18 dummy variables for tenure and firm age.[31] Industrial sector is recorded in a four-digit NACE code, and we specify eight categories which are contained in the set $\mathbb{S}$ (*Agriculture*, *Manufacturing and construction*, *Retail and services*, *Public administration*, *Education*, *Health*, *Arts, entertainment and recreation*, and *Other*). Education level is divided into three mutually exclusive categories based on the highest attained education level and stored in the set $\mathbb{E}$: Elementary education (10 years or less), high school (up to 13 years), and higher education (completed university/college degree of at least 3 years in addition to high school). Finally, we include a full set of interactions between the dummy variables for tenure and sector, and for education and sector. The vector $\mathbb{Z}_{j,t}$ includes a set of firm-specific controls and $\mathbb{X}_{i,t}$ includes worker-specific controls. Employee characteristics include age and marital status, while firm characteristics include firm size, a dummy for public firms, and a dummy for positive firm employment growth.

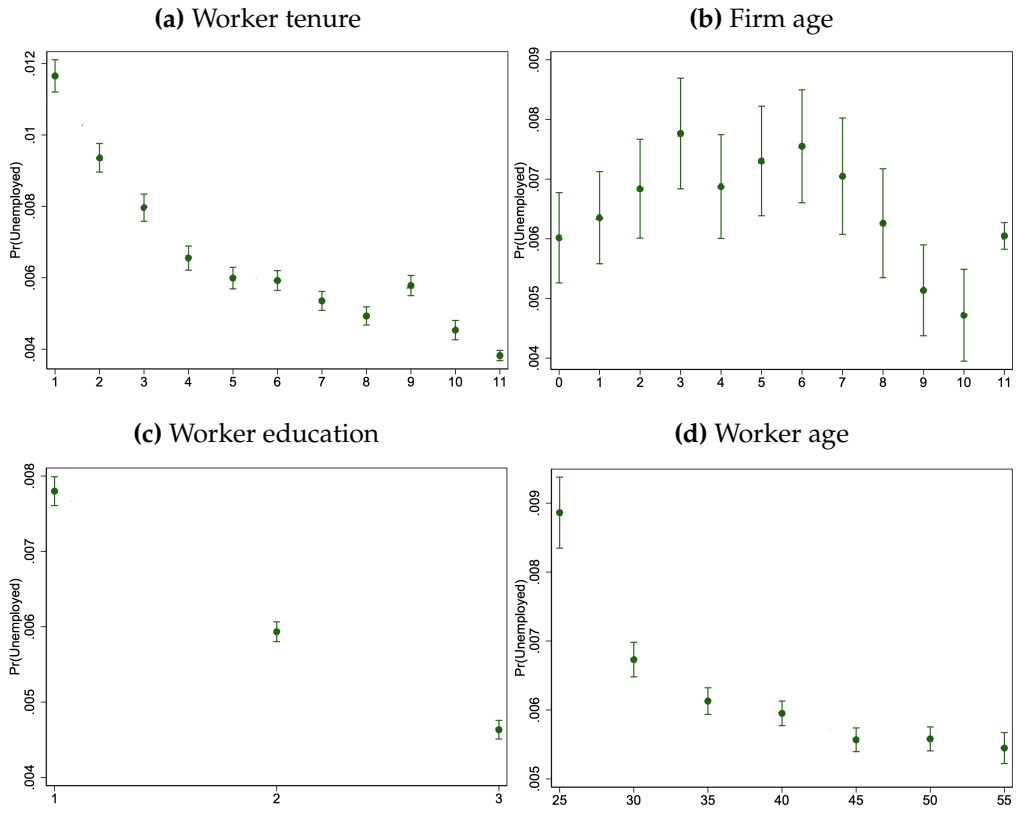
Given the strict regulations concerning job terminations in Norway, we expect job tenure to be the main predictor of unemployment. In part, because mass layoff events typically follow the "last in, first out" rule, and in part, because less experienced workers often are less valuable to the firm (particularly in the presence of firm-specific skills and learning on the job). Our estimation

[31] As we do not have employer-employee data before 1993, the measure of tenure and firm age is left censored for a subset of the observations. To minimize the problem, we top code firm age and tenure at 11 years, so that after 2002 no observations are censored. Moreover, we add a dummy for the censored observations which we interact with firm age/tenure. This ensures that the predicted labor market risk of uncensored observations is not biased by the presence of left-censoring in parts of the sample.

results show, unsurprisingly, that there is a strong decrease in the probability of unemployment as tenure increases. In Figure 1 we plot a selection of the estimated coefficients. As Figure A1a shows, the decrease in the probability of unemployment is particularly large in the first year in the job, likely due to extensive use of temporary contracts. Temporary employment is used widely as a first step towards a permanent position, and temporary workers can in many cases expect to have their contracts prolonged or to be offered a permanent position.

The probability of unemployment is decreasing monotonically in both education (Figure A1c) and age (Figure A1d) of the worker, but seem to be unrelated to firm age (Figure A1b). This is perhaps surprising, but since firm age will be closely related to worker tenure in young firms, these effects are difficult to distinguish from each other.[32]

Figure A1: Estimated probabilities of unemployment



Notes: Predicted probability of unemployment, at median. 95% confidence intervals. The predicted probabilities are the result of running the regression specified in equation 6 adding an interaction between industry and time dummies. The levels of education are defined as the highest attained level of education: 1 refers to elementary education (10 years or less), 2 refers to high school (up to 13 years), and 3 refers to higher education (completed university/college degree of at least three years in addition to high school).

[32] In the estimation, the AUROC varies from 0.74 to 0.77, with an average of 0.75.

E Details of the matching procedure

Utilizing the detailed and extensive Norwegian administrative data, which encompasses the entire Norwegian population, a high-dimensional matching procedure is implemented for adept control group construction from 1999 to 2014, adhering to the criteria specified in Section 2.3 the only difference being that these households do not become unemployed in that given year.[33] This set of eligible households is termed "Possible controls".

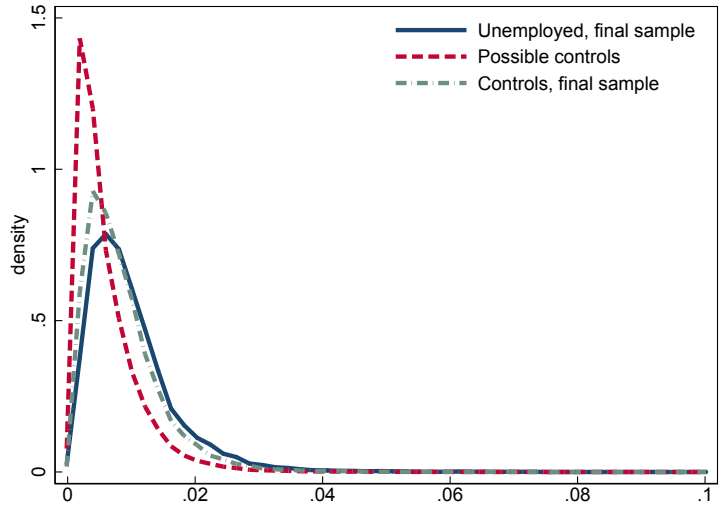
To capture labor market risk, we match on age, education, job tenure, sector of employment, and a dummy for public employment. Education level is divided into three categories: Elementary education (10 years or less), High School (up to 13 years), and Higher education (Completed University/College degree of at least 3 years in addition to High School). Tenure is divided into three bins: 1–2 years, 3–5 years, and more than five years. We consider the following eight sectors: *Agriculture*, *Manufacturing and construction*, *Retail and services*, *Public administration*, *Education*, *Health*, *Arts, entertainment and recreation*, and *Other*. All variables related to labor market risk are measured on December 31st the year prior to job loss. Labor market prospects, or the chances of re-employment after a job loss, are equally important and depend largely on the number of (relevant) jobs available in the region. To capture re-employment probabilities, we choose households in the control group that live in a labor market region of approximately the same size as their unemployed counterpart.

For our purposes the control group furthermore must be similar in both the level and the composition of wealth. We choose households for the control group with the same level of financial wealth and debt on December 31st, two years before the year of job separation. We also match them on a dummy for whether or not they own risky assets (most households in our sample do not) and a dummy for whether or not they own housing. Next, we match on income both three years prior and one year before unemployment. The financial situation of a household can clearly change significantly over a period of two to three years, particularly if the household expects an unemployment spell. The choice of matching on these variables two (three) years prior to unemployment alleviates any concern of foreward-looking behavior. We validate the choice of matching approach below in Section 4 where we show that the growth of financial assets, debt, and income of the sample of unemployed households does not deviate significantly from the control group in any of the years before the onset of unemployment. Both groups exhibit a gradual increase in financial assets, debt, and income over the four years leading up to unemployment.

On discrete and discretized variables (education, tenure, sector of employment, ownership of risky assets, and homeownership), each household in the sample of potential controls are exactly matched to an unemployed household. For continuous variables (age, financial wealth, debt, and income), we choose individuals that fall within a $\pm\alpha$ interval around the unemployed household. For age we choose $\alpha = 5$ years; for debt and financial wealth, we choose $\alpha = 15\%$; for income, three years before unemployment we choose $\alpha = 10\%$ and for income one year before, we choose

[33] For an alternative control group construction methodology, see Flaaen et al. (2019).

Figure A2: Distributions of predicted unemployment probabilities



Notes: The distribution of predicted probability of unemployment. Kernel density estimates, with Epanechnikov kernel.

$\alpha = 20\%$. We allow each potential control to be matched to more than one unemployed household, and we allow each unemployed household to have more than one match (n-to-m matching). Unemployed households that we cannot match to at least one household in the control group are excluded from the analysis. Since we allow for an unemployed household to be matched to more than one household in the control group, all regressions and statistics presented below are weighted. See Appendix E for more details.

Figure A2 shows the distribution of the probability of unemployment in both the treatment group, the set of possible control households, and finally, the chosen control group. We see that the distribution of unemployment probabilities for the sample of who actually becomes unemployed the consecutive year (solid blue line) lies distinctly to the right of the sample of possible controls (red dashed line) and also has a significantly fatter right tail compared to the workers who do not experience job loss the year after. On the other hand, the distribution of unemployment probabilities in the final control sample (grey dashed line) is much closer to the treatment group. This highlights the importance of matching on the key variables predicting unemployment (tenure, age, education, and industry). Figure A2 underscores the significance of key variable matching—such as tenure and age—in predicting unemployment, by illustrating the comparative distribution of unemployment probabilities amongst the treatment group, possible controls, and the selected control group.

Each treated household and its chosen controls is called a *strata*. Households in the sample of eligible controls are allowed to be matched to more than one unemployed household, and will thus be included in more than one stratum. This implies that they will appear in the final dataset more than once, but the weighting scheme described below ensures that they are still given weight

proportional to the number of strata they appear in and their importance within those strata.

Matching is done on a year-to-year basis, and households who become unemployed in 2004 are matched to households who are present in 2004. This ensures that the households in the control group are subject to the same business cycle fluctuations as the unemployed households.

The sample of eligible matches in a given year does not include anyone who experiences an unemployment spell in that year, but they may experience unemployment later. This means that the sample of possible controls will include households that will be chosen for the treatment group in the future. This is important because we do not want to choose our controls based on the criteria that they do not experience unemployment in the future. It would be unfortunate to select only households with a much lower probability of unemployment.

E.1 Constructing weights

We follow the weighting scheme in Iacus et al. (2012). These weights ensure that households in the control group are not given more importance than the households they are matched to. The weights are constructed using the formula

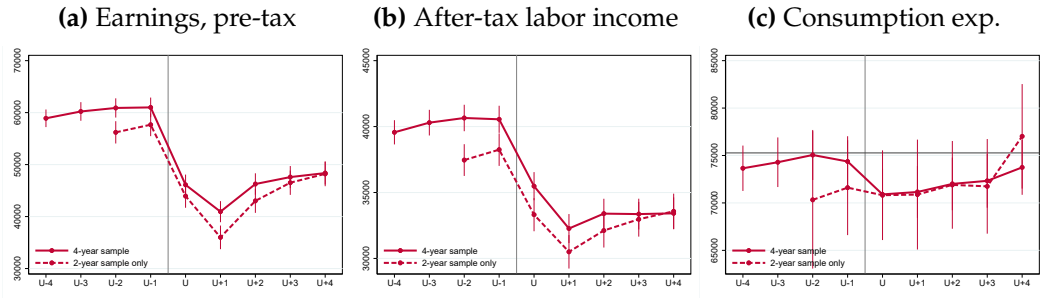
$$w_i = \begin{cases} 1, & \text{if treated} \\ \frac{m_c}{m_t}\frac{m_t^s}{m_c^s}, & \text{if control.} \end{cases}$$

where m_t and m_c are the total numbers of treated and controls, respectively, and m_t^s and m_c^s are the numbers of treated and controls in the specific stratum. Weights are constructed so that they are specific to the year of unemployment (i.e. m_t and m_c reflect the total number of treated and controls the year they become unemployed). They are also variable-specific. Although Norwegian Registry data is generally comprehensive and has few missing observations, there are still missing observations, particularly in the consumption measure. We take this into account when constructing weights, and exclude missing observations when constructing the weights needed for analysis of that particular variable.

This implies that all households in the control group are given equal weight.

F Additional tables and figures

Figure A3: Earnings and expenditure responses by varying sample restrictions



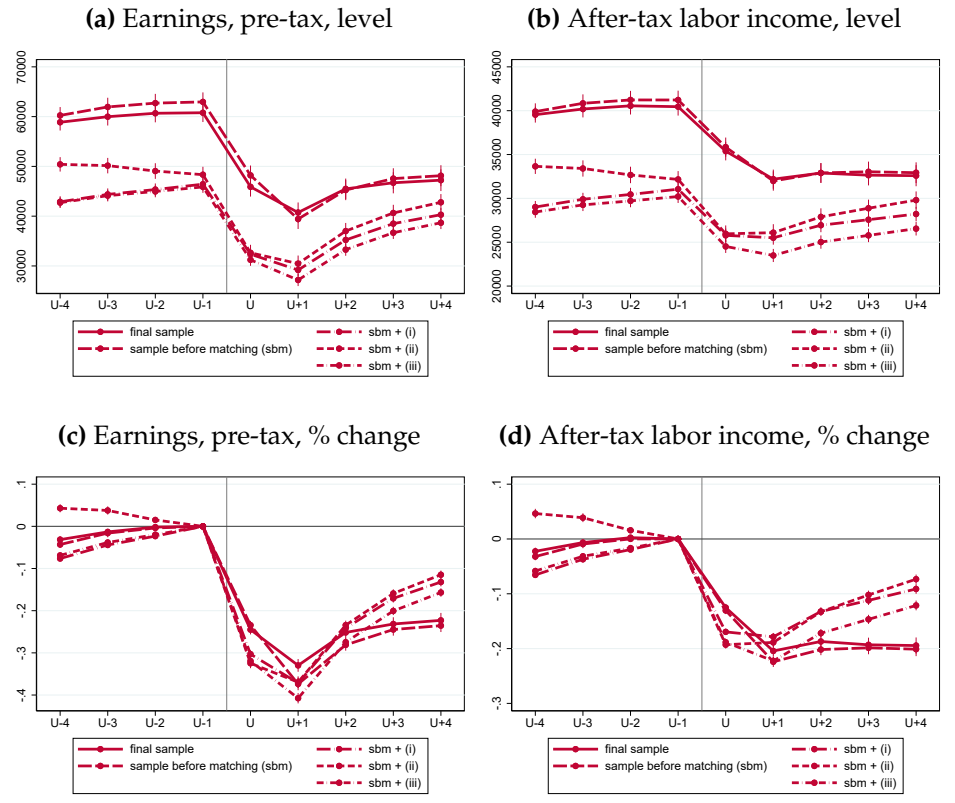
Notes: The figures show the results of running the following estimation equation in a sample where we relax the requirement of four years without any unemployment spells to two years: $Y_{i,j,t} = \alpha_j + \sum_{k\in\{-4:4\}} \beta_k U^k_{i,t} + \sum_{k\in\{-4,\ldots,-2,0,\ldots,4\}} \phi_k U^k_{i,t} \times S^k_i + \tau_t + \varepsilon_{i,t}$, where S_i is a dummy indicating whether the household belongs to the four-year-restriction sample or the two-year-restriction sample, and τ_t are time-fixed effects. 95% confidence intervals. Standard errors are clustered at the household level.

Table A3: Summary statistics (means) for targeted and non-targeted variables, including the difference between unemployed and control group

	Unemployed	Control group	Difference	Possible controls
Targeted variables				
Demographics				
Age	44.7	44.7	0.0	46.1
Balance-sheet				
Male labor income	77040.2	75819.4	1220.8***	82384.4
Debt	198963.1	191221.2	7741.9***	197838.8
Financial assets	35828.4	34543.3	1285.2**	124112.4
Share Homeowner	0.94	0.95	-0.01***	0.89
Education				
Low education	0.35	0.35	0.00	0.28
High School Education	0.43	0.43	-0.00	0.36
Higher Education	0.22	0.22	0.00	0.35
Industry composition				
Agriculture	0.01	0.00	0.00**	0.01
Education	0.03	0.02	0.00***	0.05
Health and social services	0.03	0.02	0.01	0.04***
Manufacturing and construction	0.37	0.39	-0.02***	0.26
Other services	0.01	0.01	0.00***	0.02
Public admin. and defence	0.02	0.02	0.00**	0.06
Retail and services	0.47	0.49	-0.01***	0.30
Unknown	0.05	0.04	0.01***	0.26
Employment				
Firm tenure	6.9	7.1	-0.2***	7.1
Non-targeted variables				
Demographics				
Share with children (%)	66.9	67.9	-0.9**	55.1
Number of children	1.4	1.5	-0.0	1.2
Balance-sheet				
Consumption	101157.0	100621.9	535.1	111451.6
Spousal labor income	47198.4	46885.4	313.0	45643.5
Safe assets	25576.4	24098.2	1478.2***	49389.2
Risky assets	10252.1	10445.1	-193.0	74723.2
Share receiving sickness benefits (%)	10.7	10.5	0.3	9.6
Share receiving disability benefits (%)	0.2	0.3	-0.1**	3.4
Employment				
Estimated probability (%)	1.0	0.9	0.1***	0.6
N	11,497	147,027	-	251,618

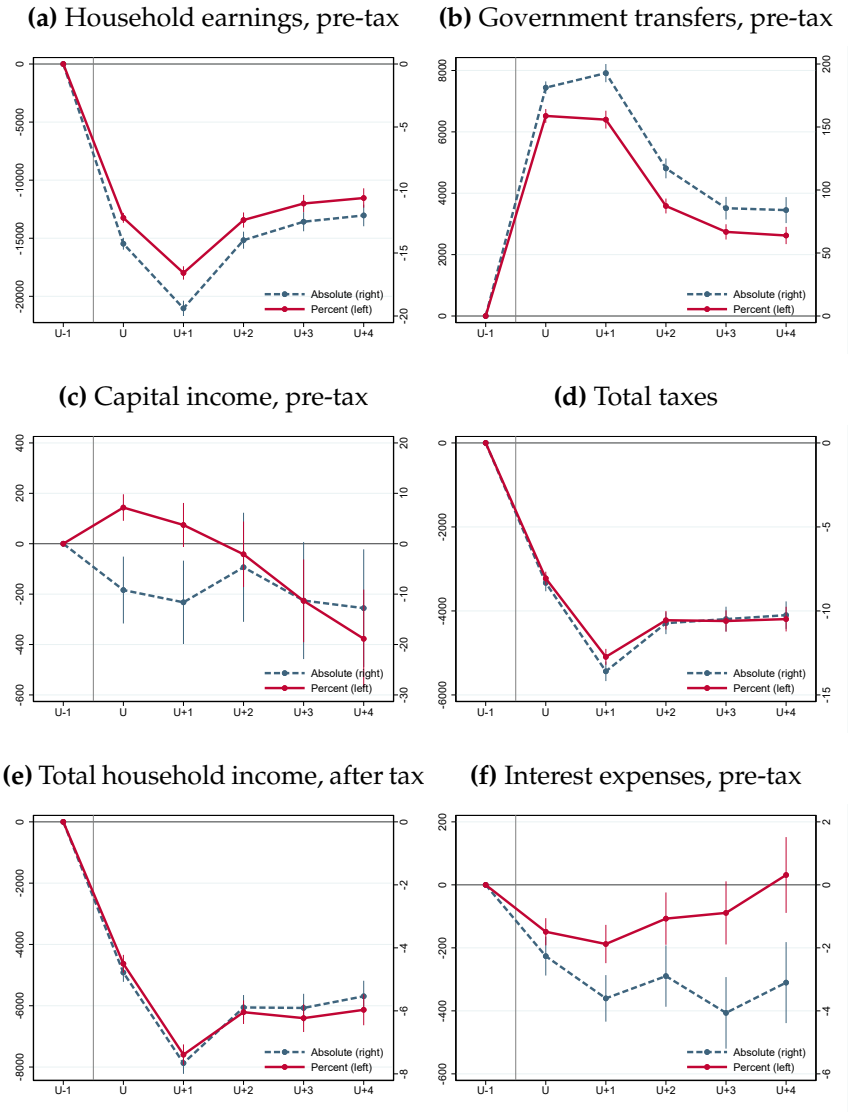
Notes: Monetary values are CPI-adjusted with 2014 as base year, and measured in USD (NOK/USD = 6.3019). Possible controls include the full set of households that satisfy all sample selection criteria except actual job loss. The column termed "Difference" reports the difference between treated and control, where *, **, *** denote significance at the 10, 5, and 1 percent levels, respectively. The mean of the control group is weighted using CEM-weights, see Online Appendix E. All variables are measured two years prior to the year of job loss, except tenure and the probability of unemployment which is measured one year prior to job loss, and age which is measured in the year of job loss. The estimated probability of job loss is based on a probit regression with the following controls: public employer, tenure, education, industry, firm age, and firm size (see Online Appendix D for details).

Figure A4: Earnings and income after tax when varying the sample selection restrictions



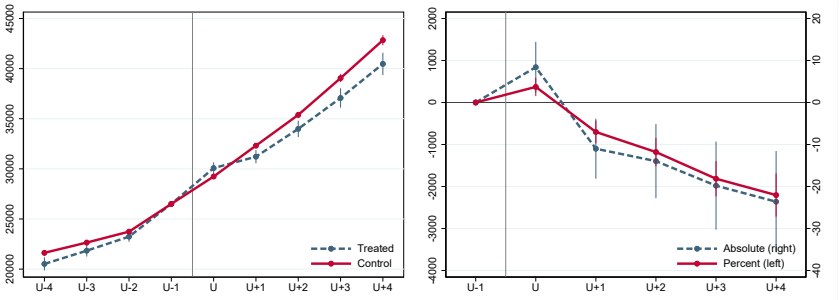
Notes: The figures show the results of running the following estimation equation in a sample where we relax the requirement of four years without any unemployment spells to two years: $Y_{i,j,t} = \alpha_j + \sum_{k\in\{-4:4\}} \beta_k U^k_{i,t} + \tau_t + \varepsilon_{i,t}$, where $U^k_{i,t}$ denote time relative to the event, and τ_t are time-fixed effects. Each line shows the estimation result for a given variation of the sample selection restrictions: (i) includes individuals registered as single, (ii) includes households going through divorce or formation in the pre-period, and (iii) includes households with business income. The sample before matching is the sample obtained after imposing all sample selection restrictions, but without excluding individuals that cannot be matched to one or more controls. 95% confidence intervals. Standard errors are clustered at the household level.

Figure A5: Average treatment effect, income and non-consumption expenses

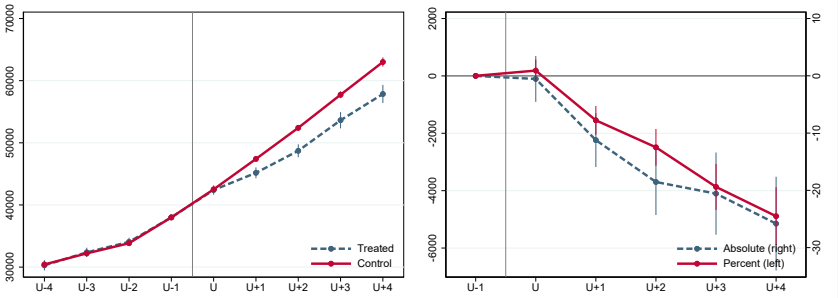


Notes Each figure show the difference between the treated and the control group in the years after unemployment, measured both in absolute terms (left-hand-side axes) and percentage change relative to pre-job loss average (right-hand sde axes). Top and bottom 1% of observations are censored when estimating percentage change. Vertical lines show 95% confidence intervals, and standard errors are clustered at the level of the matching group. Observations are weighted using CEM-weights, described in appendix E. Monetary values are CPI-adjusted with 2014 as base year, and measured in USD (NOK/USD=6.3019).

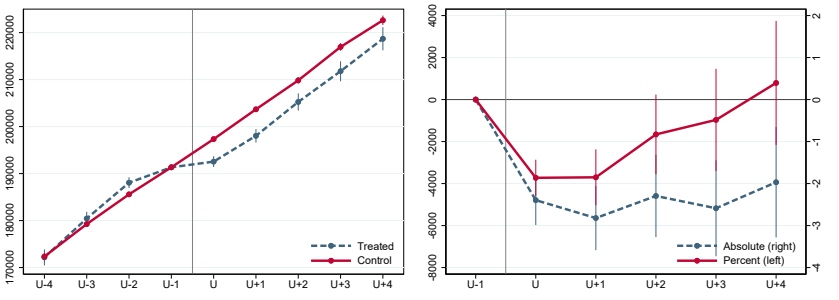
Figure A6: The development after job loss, wealth



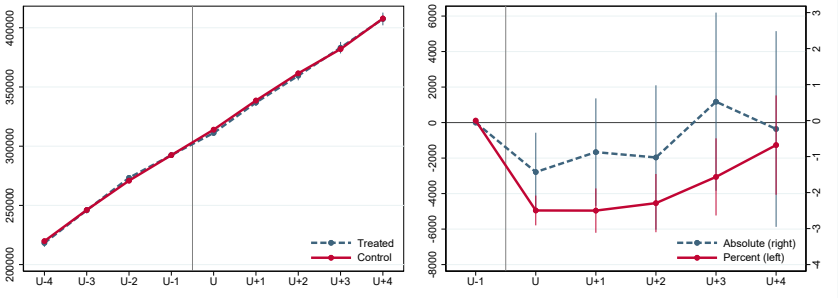
(a) Deposits



(b) Liquid wealth, gross



(c) Debt



(d) Housing Wealth

Notes The left column shows the dynamic path of each outcome variable ($\beta_k + \phi_k \times T_i$), whereas the right column show the difference between the treated and the control group (ϕ_k), measured both in absolute terms (left-hand-side axes) and percentage change relative to pre-job loss average (right-hand sde axes). Top and bottom 1% of observations are censored when estimating percentage change. Vertical lines show 95% confidence intervals, and standard errors are clustered at the level of the matching group. Observations are weighted using CEM-weights, described in appendix E. Monetary values are CPI-adjusted with 2014 as base year, and measured in USD (NOK/USD=6.3019).

Table A4: Testing the common trend in the years before unemployment

	Consumption	Male labor income	Female labor income	Safe assets	Risky assets	Debt
Absolute change, average difference						
$\Delta_1 X_{U-3}$	-140.6	505.6***	-64.2	305.0	-49.8	1358.8**
$\Delta_1 X_{U-2}$	679.9	196.4	-183.1*	307.7	-255.2	1293.9**
$\Delta_1 X_{U-1}$	-973.1*	-580.3***	-83.1	502.0*	-723.0***	-2480.6***
$\Delta_3 X_{U-1}$	-536.4	43.0	-415.4***	1163.7***	-1030.7***	-62.7
Absolute change, median difference						
$\Delta_1 X_{U-3}$	43.2	57.3	-93.4*	-2.0	0.0	197.2
$\Delta_1 X_{U-2}$	97.8	-26.3	-84.4*	100.4*	0.0	-184.2
$\Delta_1 X_{U-1}$	-392.2	-588.7***	-54.4	29.5	0.0	-423.0**
$\Delta_3 X_{U-1}$	-221.8	-465.1***	-364.5***	219.3**	0.0	-924.3***
Percentage change, average difference						
$\Delta_1 X_{U-3}$	-0.1	-0.0	-0.4***	1.4*	1.0	0.1
$\Delta_1 X_{U-2}$	-0.1	-0.0	-0.1	3.5***	-1.0	-0.0
$\Delta_1 X_{U-1}$	-0.2	-0.5***	-0.2*	1.1	0.0	-0.2*
$\Delta_3 X_{U-1}$	-0.0	-0.4***	-1.0***	5.3***	-169.8	-0.5
Percentage change, median difference						
$\Delta_1 X_{U-3}$	-0.1	0.1	-0.2**	0.6	0.0	0.2
$\Delta_1 X_{U-2}$	0.0	-0.0	-0.2***	1.9***	0.0	-0.1
$\Delta_1 X_{U-1}$	-0.5	-0.9***	-0.2**	0.5	0.0	-0.2
$\Delta_3 X_{U-1}$	-0.6	-0.7***	-0.7***	4.8***	0.0	-0.8***

Notes: Monetary values are CPI adjusted with 2014 as base year, and measured in USD (NOK/USD = 6.3019). Top/bottom 5 percent are excluded for each variable when comparing differences in percentage growth. The differences reported are the estimates of ϕ_k from the following regression: $\Delta_h X_{i,t} = \sum_{k=-3}^{-1} \beta_k U_{i,t}^k + \sum_{k=-3}^{-1} \phi_k U_{i,t}^k \times T_{i,t-k} + \varepsilon_{i,t}$, which is estimated using weights from the matching procedure(for medians we use quantile regressions). *, **, *** denote significance at the 10, 5, and 1 percent level, respectively.

Table A5: The change in pre-tax earnings, after tax labor income and consumption expenditure after unemployment, by the distribution of LTI and of DTI

	Low LTI	Mid LTI	High LTI	Low DTI	Mid DTI	High DTI
			Pre-tax earnings			
U0	-8.5***	-9.1***	-10.2***	-8.7***	-9.5***	-9.7***
	(0.3)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
U1	-13.2***	-15.4***	-16.5***	-16.3***	-15.1***	-13.6***
	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
U2	-11.3***	-13.3***	-15.0***	-15.1***	-12.6***	-11.9***
	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
U3	-10.4***	-14.0***	-14.8***	-15.4***	-12.7***	-10.9***
	(0.7)	(0.6)	(0.7)	(0.6)	(0.7)	(0.7)
U4	-10.2***	-13.8***	-14.5***	-15.3***	-12.8***	-10.3***
	(0.8)	(0.7)	(0.8)	(0.8)	(0.7)	(0.8)
Accumulated change	-53.6***	-65.6***	-71.0***	-70.9***	-62.7***	-56.4***
	(2.4)	(2.2)	(2.3)	(2.2)	(2.3)	(2.3)
			After-tax labor income			
	Low LTI	Mid LTI	High LTI	Low DTI	Mid DTI	High DTI
U0	-19.1***	-19.1***	-20.0***	-18.3***	-19.5***	-20.3***
	(0.7)	(0.5)	(0.6)	(0.6)	(0.6)	(0.6)
U1	-26.1***	-25.9***	-27.8***	-27.8***	-25.9***	-26.0***
	(0.9)	(0.7)	(1.3)	(0.8)	(0.8)	(1.3)
U2	-19.3***	-19.4***	-20.8***	-21.9***	-18.6***	-19.1***
	(1.4)	(0.8)	(0.7)	(0.7)	(0.9)	(1.3)
U3	-15.0***	-17.8***	-18.9***	-19.7***	-16.8***	-15.1***
	(0.8)	(0.8)	(0.8)	(0.7)	(0.8)	(0.8)
U4	-14.2***	-17.1***	-17.6***	-18.9***	-16.7***	-13.1***
	(0.9)	(0.8)	(0.9)	(0.8)	(0.8)	(0.9)
Accumulated change	-93.7***	-99.2***	-105.0***	-106.6***	-97.5***	-93.7***
	(3.4)	(2.9)	(3.0)	(2.8)	(3.2)	(3.3)
			Consumption Expenditure			
	Low LTI	Mid LTI	High LTI	Low DTI	Mid DTI	High DTI
U0	-5.9***	-6.4***	-0.7	-2.4***	-4.6***	-6.5***
	(0.6)	(0.6)	(0.8)	(0.7)	(0.6)	(0.7)
U1	-5.6***	-7.6***	-1.7**	-2.5***	-5.3***	-7.1***
	(0.7)	(0.7)	(0.9)	(0.7)	(0.7)	(0.8)
U2	-5.4***	-6.9***	-2.1**	-3.0***	-4.9***	-6.9***
	(0.7)	(0.8)	(0.9)	(0.8)	(0.8)	(0.8)
U3	-5.1***	-5.8***	-2.2**	-2.4***	-4.2***	-7.3***
	(0.8)	(0.9)	(1.0)	(0.8)	(0.9)	(1.0)
U4	-4.6***	-6.8***	0.3	-1.6*	-4.3***	-5.5***
	(0.9)	(0.9)	(1.1)	(0.9)	(0.9)	(1.0)
Accumulated change	-26.7***	-33.4***	-6.3*	-12.0***	-23.3***	-33.3***
	(2.5)	(2.7)	(3.4)	(2.7)	(2.7)	(3.0)
N	3,848	3,827	3,822	3,804	3,818	3,875

Notes: The numbers reported here correspond to the figures shown in Figure 3. *Accumulated change* reports the accumulated coefficients from year *U* to year *U+4*. Terciles are computed for each calendar-year cohort of job losers using the mean of LTI or DTI in the two years preceeding job loss. Top and bottom 1% are excluded. Standard errors (in parentheses) are clustered at the matching group level.

Table A6: The change in pre-tax earnings, after tax labor income and consumption expenditure after unemployment, by LTI-DTI

	Low LTI, low DTI	Low LTI, high DTI	High LTI, low DTI	High LTI, high DTI
	Pre-tax earnings			
U0	-8.4***	-8.7***	-9.4***	-10.5***
	(0.5)	(0.5)	(0.3)	(0.5)
U1	-14.0***	-12.3***	-16.3***	-14.9***
	(0.7)	(0.7)	(0.4)	(0.7)
U2	-12.5***	-10.0***	-14.4***	-13.6***
	(0.8)	(0.8)	(0.5)	(0.8)
U3	-11.2***	-9.4***	-15.1***	-12.3***
	(1.0)	(1.0)	(0.5)	(0.9)
U4	-10.9***	-9.4***	-15.1***	-11.1***
	(1.1)	(1.1)	(0.6)	(1.0)
Accumulated change	-57.0***	-49.8***	-70.3***	-62.4***
	(3.4)	(3.3)	(1.8)	(3.1)
	After-tax labor income			
	Low LTI, low DTI	Low LTI, high DTI	High LTI, low DTI	High LTI, high DTI
U0	-18.9***	-19.3***	-18.9***	-21.2***
	(0.9)	(1.1)	(0.5)	(0.7)
U1	-27.0***	-25.2***	-26.8***	-26.8***
	(1.2)	(1.4)	(0.7)	(2.1)
U2	-19.9***	-18.6***	-20.3***	-19.5***
	(1.4)	(2.4)	(0.6)	(1.0)
U3	-16.0***	-13.9***	-19.0***	-16.3***
	(1.1)	(1.1)	(0.6)	(1.1)
U4	-15.8***	-12.3***	-18.5***	-13.9***
	(1.2)	(1.3)	(0.7)	(1.2)
Accumulated change	-97.7***	-89.3***	-103.6***	-97.8***
	(4.5)	(5.2)	(2.4)	(4.3)
	Consumption Expenditure			
	Low LTI, low DTI	Low LTI, high DTI	High LTI, low DTI	High LTI, high DTI
U0	-4.9***	-7.5***	-3.0***	-5.6***
	(0.7)	(0.9)	(0.6)	(1.1)
U1	-4.5***	-6.7***	-3.7***	-7.3***
	(0.8)	(1.0)	(0.6)	(1.1)
U2	-5.4***	-6.4***	-3.9***	-7.4***
	(0.9)	(1.2)	(0.7)	(1.3)
U3	-3.8***	-7.2***	-3.4***	-7.9***
	(1.0)	(1.3)	(0.7)	(1.4)
U4	-3.8***	-5.8***	-3.2***	-5.8***
	(1.1)	(1.4)	(0.8)	(1.5)
Accumulated change	-22.5***	-33.6***	-17.3***	-34.1***
	(3.1)	(4.0)	(2.4)	(4.5)
N	2,016	1,832	5,606	2,043

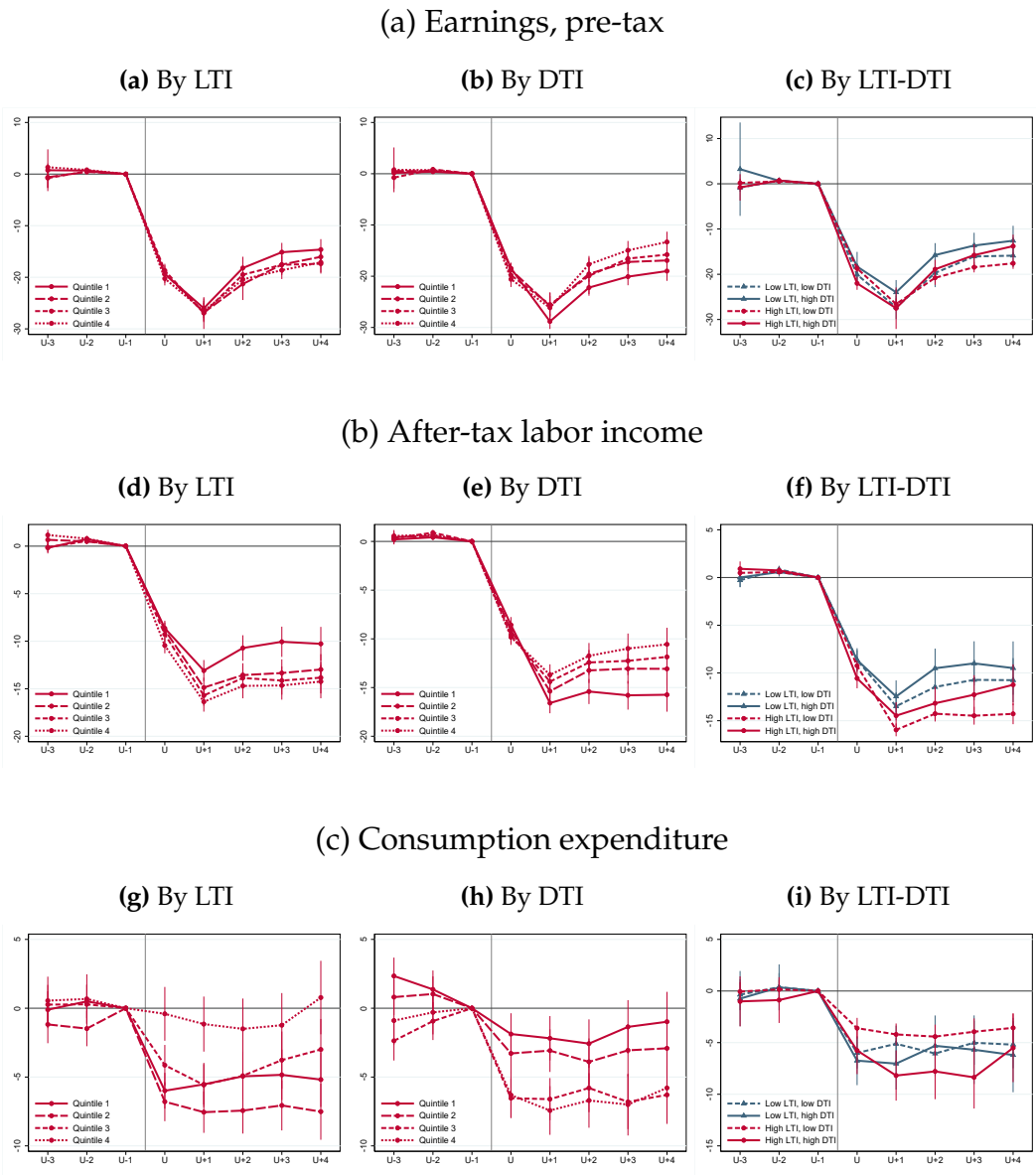
Notes: The numbers reported here correspond to the figures shown in Figure 3. *Accumulated change* reports the accumulated coefficients from year *U* to year *U+4*. Low (high) LTI refers to tercile 1 (2,3) of the distribution of liquid-assets-to-income. A high (low) DTI refers to tercile three (1,2) of the distribution of debt-to-income. Terciles are computed for each calendar-year cohort of job losers using the mean of LTI or DTI in the two years preceeding job loss. Top and bottom 1% are excluded. Standard errors (in parentheses) are clustered at the matching group level.

Table A7: The MPC across the business cycle - OECD

	I	II	III
Income Shock$_t$	0.406***	0.375***	0.379***
	(0.0609)	(0.0378)	(0.0457)
Income Shock$_t$*recession$_t$	0.0245		
	(0.0809)		
Income Shock$_t$*DTI$_{t-1}$=medium		-0.109**	
		(0.0404)	
Income Shock$_t$*DTI$_{t-1}$=high		0.232**	
		(0.0709)	
Income Shock$_t$*Medium DTI$_{t-1}$*normal$_t$			-0.195**
			(0.0569)
Income Shock$_t$*High DTI$_{t-1}$*normal$_t$			0.288**
			(0.116)
Income Shock$_t$*Low DTI$_{t-1}$*recession$_t$			-0.00602
			(0.0425)
Income Shock$_t$*Medium DTI$_{t-1}$*recession$_t$			0.0206
			(0.118)
Income Shock$_t$*High DTI$_{t-1}$*recession$_t$			0.128*
			(0.0551)
N	11425	11425	11425

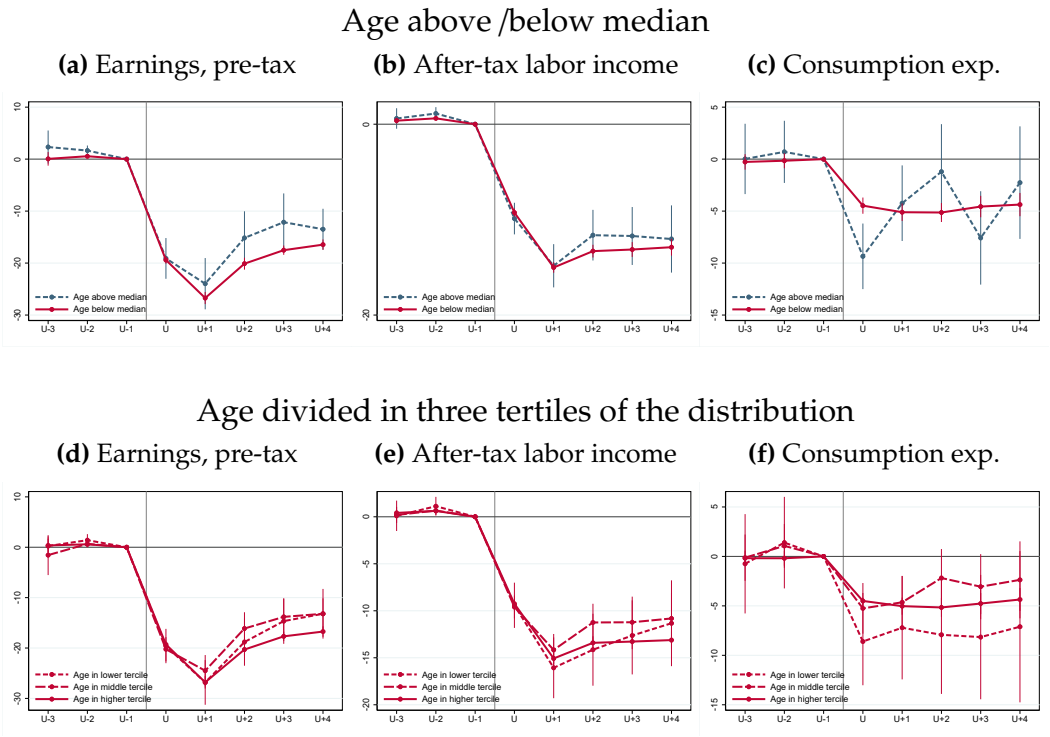
Notes: Recessions as defined by OECD: https://fred.stlouisfed.org/series/NORREC. Controls include a fourth-order polynomial in age, a second-order polynomial of no. of children below age 18, year fixed effects, a dummy for marital status, and lagged household income, liquid assets, and net wealth. *, **, *** denote significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered at the industry level.

Figure A7: Earnings and expenditure responses across LTI and DTI groups. Robustness: Quartiles of the distribution of LTI and DTI



Notes: Low (high) LTI refers to quartile 1 (2,3,4) of the distribution of liquid-assets-to-income. A high (low) DTI refers to quartile 4 (1,2,3) of the distribution of debt-to-income. Quartiles are computed for each calendar-year cohort of job losers using the mean of LTI or DTI in the two years preceding job loss. Top and bottom 1% are excluded. 95% confidence intervals. Standard errors are clustered at the matching group level.

Figure A8: Earnings and expenditure responses by age



Notes: Top and bottom 1% are excluded. 95% confidence intervals. Standars errors are clustered at the matching group level. Age-groups are computed based on the age of the job loser in the year of unemployment, and are kept constant throug the event window. In the plot with two age groups, the average age in the below-median group is 38.9 years, and 44.8 in the above-median group. In the plots with three age groups, the average age in the lower tertile is 36.8, in the middle tertile 41.6, and in the higher tertile 45.1.