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**Do Economic Recessions
'Squeeze the Middle-Class'?**

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Abstract: We examine whether economic downturns reshape the distribution of population income giving rise to a "middle-class squeeze." We test this hypothesis using alternative definitions of middle-class, such as income-based measures from the Luxembourg Income Study (LIS), and perceived measures from the Integrated Values Study (IVS). Our findings suggest that, although recessions do not produce a middle-class squeeze overall, the unanticipated shocks resulting from the Great Recession did. Furthermore, we find that recessions increase the share of the population that regards itself as 'middle-class.' Estimates are heterogeneous to the baseline unemployment at the time of a recession, country spending on social protection, to middle-class measures and definitions.

Keywords: Middle-class, Great Recession, LIS & IVS data, employment shocks, income distribution, social insurance.

JEL codes: F22, I30, J64.

1 Introduction

There is ample agreement in the literature that a sizeable middle-class protects against socioeconomic and political instability. For instance, support for democracy is more likely to endure in countries with a relatively large middle-class size (Barro, 1999). Similarly, countries with a larger middle-class are more likely to boost innovation, entrepreneurship and productivity (Acemoglu and Zilibotti, 1997) by stimulating human capital accumulation (Alesina and Perotti, 1996, Doepke and Zilibotti, 2005) and upward mobility (Easterly, 2001)[3] alongside reducing so-called 'latent class conflicts' (Thurow, 1984).

There is some evidence suggesting a 'flattening out' of the middle-class (Kroll, 2011), but so far findings are not robust, let alone the identification of the underlying mechanisms behind it. Among the potentially exogenous determinants, macroeconomic conditions are on top of the list (Pressman, 2007). Unexpected 'economic shocks' - such as those associated with the Great Recession - can be argued to lead to a so-called 'middle-class squeeze.' The latter in particular has received limited consideration in the academic literature, this contrasting the frequent media attention on middle-class squeezing, especially during the last decade and starting from the Great Recession.

This paper examines the effect of employment shocks, namely an employment change during a recession which was not anticipated, on both the share of income of the middle-class and its size[4]. Also, we contribute to this question by examining the specific effect of the Great

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[3] However, this might differ between developed and developing countries. Banerjee and Duflo (2008) finds that what characterizes the middle-class in developing countries setting is primary having stable employment.

[4] According to the permanent income hypothesis, the effect of an unemployment shock on income and consumption is larger when is not anticipated. Christelis et al. (2015) argues that this most likely the case for those who became unemployed after the Great Recession.

Recession, and to whether the so-called 'middle-class squeeze' is heterogeneous depending on the specific middle-class measure adopted. We also test if countries' social spending protects against adverse income shocks from unemployment during recessions through unemployment insurance and welfare benefits spending.

A recessionary period is defined as at least two consecutive quarters of negative quarter-on-quarter growth in seasonally adjusted real GDP[5]. Likewise, we distinguish the effect of substantial recessionary periods from the rest. The Great Recession, which was triggered in 2007 by the US subprime mortgage crisis, was the worst global recession since World War II, and it was mostly unanticipated (Christelis et al., 2015). It started in December 2007 in the U.S. and ended there in June 2009. However, only during 2009, the world economy was in a state of the global recession with an overall decline of the World GDP per capita[6].

In western countries, the income effects of economic shocks can be accommodated both via wage bargaining and labor regulations and, partially insured through unemployment subsidies, social benefits, and subsidized public services (Dallinguer, 2013). Similarly, we also examine whether the effect of an economic recession is likely to depend on the duration and depth of recessions. That is, while short lasting recessions might have negligible effects and can be easily accommodated by credit mechanisms counteracting liquidity constraints; credit mechanisms might not persist when recessions are long-lasting. However, some recessions give rise to specific policy interventions such as austerity cuts which reduce the potential accommodating effect of employment insurance, as it was in the case of the Great Recession.

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[5] A discussion about the pros and cons of such definition can be found in (Keegan et al., 2013)
[6] In addition, the Great Recession led to a sharp decline in international trade, a rapid rise in unemployment in many countries, and slumping prices for many commodities.

Hence, the magnitude of the hypothetical squeeze of the middle-classes after a recession largely depends on both the nature of a recession as well as on the institutions put in place to accommodate its impact.

An essential question, when documenting the effect of a recession on the size of the middle-class, lies in its measurement. Generally speaking, middle-class measures are divided between those grounded on income or consumption measures (e.g., defined by an income cut-off point relative to a poverty measure, or to the income distribution in a given population) and those based on broader social definitions; these involve occupational or class status, and income self-perception. Both definitions capture different features of what we mean by 'middle-class' (Atkinson and Brandolini, 2013). Unsurprisingly, sociological definitions, which reflect individual identity as middle-class, are generally more stable measures of occupational or self-perceived status, while income-based definitions are typically time-varying and heterogeneous depending on the income's definition adopted. In this paper, and by accessing the Luxembourg Income Study (LIS) data, we can distinguish between overall disposable income, labor income, and market income, and explore if and how our estimates change depending on income definition. Indeed, we empirically document whether a recession with a deep and lasting effect might exert an influence on middle-class size irrespective of different definitions. We take advantage of several income and social-based definitions of middle-class measures. Together with the data from LIS, we construct variables to measure middle-class self-perception by jointly using the World Value Survey (longitudinal files covering Waves 1 to 6 for the 1981-2014 period) and the European Values Study (longitudinal data covering waves 1 to 4 for the period 1981 – 2008), referred henceforth as integrated Values Study (IVS).

We do not find evidence of a 'middle-class squeeze' resulting from an unexpected employment shock, namely an economic recession interacted with the unemployment rate. However, when we explore the effect of a largely unanticipated shock such as the Great Recession, we find evidence of squeezing, but only on labor income. This is robust to alternative specifications controlling for the depth and duration of the recessions. Nonetheless, the effect is heterogeneous across income based middle-class definitions. Importantly, we find a larger share of the population regarding itself as a middle-class after a recession.

The paper is structured as follows. The next section is a summary background discussion about middle-class and recession measurement issues. Section three contains a description of the data and methods employed. Section four reports the study's results, and a final section concludes.

2 Measuring the size of the middle-class

Defining the middle-class is not a straightforward task. Middle-class is a multi-dimensional concept, identifiable from individual-based consumption, income, and wealth data. There is no consensus, however, on its definition (Casehll, 2007). The US Census Bureau publishes figures breaking down the income distribution into quintiles, and defines the middle-class' based on choosing a set of quintiles in the middle of the distribution. However, it is possible to employ a number of different definitions.

2.1 Income-based approaches: (i) *inequality* and (ii) *size*

To measure income-based middle-class, we use the LIS dataset. We can summarize income-based criteria in two main categories: (i) inequality-based and (ii) size-based measures

(Atkinson and Brandolini, 2013).

2.1.1 Inequality-based measures

The first set of middle-class's measures we consider are those based on fixing first a middle section of the income distribution as the one qualifying the middle-class and then calculating the share of total income owned by the predefined section. We call them inequality-based measures. Regarding the first step, we measure the percent income held by the population (i) in the third quintile and (ii) in the second to the fourth quintile of the income distribution. In doing so, we follow, for example, Easterly (2001), who considers the income share of the three middle quintiles (leaving out the poorest 20% and the wealthiest 20%).[7]

2.1.2 Size-based measures

Size-based measures invert the methodology outlined above by fixing first a threshold around an average or median statistic of the population's distribution and then proceed by calculating the percentage population contained within the pre-determined threshold. This has been done, for example, by Pressman (2007) who adopts a uniform definition of middle-class as households receiving between 75% and 125% of median household income, adjusted for family composition, and which has been used to study the income evolution over time in several countries and by using the LIS database as we do here. As suggested in Atkinson and Brandolini (2013), we also refer to an alternative middle-class' size for robustness, as the percentage of the population between 60 %and 250% of the median income.[8]

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[7] Solimano (2008) defines even a broader middle-class, one comprising individuals belonging to deciles 3 to 9.
[8] There are also methodologies to define middle-class for developing countries. See, for example Ferreira (2013), Lopez-Calva and Ortiz-Juarez (2011), Ravallion (2009), and Birdsall (2007).

2.2 Sociological approaches

To measure self-perception of belonging to the middle-class, we use the IVS individual survey data and build country-level measures of middle-class self-perception. One can define the middle-class drawing on sociologically based definitions which typically refer to either functional structure (Goldthrope 1987) or self-reported class and income group. However, the former is more stable over time, while the latter is more likely to vary if individuals update their perceptions with information on their actual income.

Ferreira et al. (2003), adopted a subjective approach, based on self-reported class membership. This is derived by tracing the lower threshold as the lowest income level where most people regard themselves as members of the middle-class. The lowest income threshold, where most people identify themselves as middle-class, was similar to the one offered in Lopez-Calva and Ortiz-Juarez (2011), a paper that used the probability of vulnerability to poverty, an approach which allowed to set the level at $10 per day per capita. However, the self-reported class structure is influenced by the perceived income distribution in the country, which might be culture-specific and hence limits its use for cross-country comparisons. Belonging to the middle-class is an appealing idea to which individuals wish to belong to, and might classify themselves in such a way depending on the presence of welfare states, protective labor market regulations, access to public health, education, and housing.

Overall, and despite the extensive literature on the middle-class size and its socioeconomic effects, the evidence evaluating the impact that recessions had on middle-class size is skinny. This paper attempts to fill this gap, especially considering the unusual depth of the recession cycle started in 2007, a unique event since WWII. Our results suggest two main

findings. First, recessions have a negative, but rarely significant, direct effect on middle-class'
size. Second, the effect of the Great Recession has been large and significant, suggesting the
unique nature of the latest recession in squeezing middle-class' wealth in the Western world.

3 Data and empirical strategy

This section describes the data and the methodology employed. Our dependent variable
considers several different definitions of middle-class size.

3.1 Middle-class measures from LIS data

We exploit inequality and size-based middle-class measures by using income distributions from
the Luxembourg Income Study (LIS) household database, referring to the 1980-2013 period. Our
sample draws initially from 197 micro-data sets, but we include only countries with more than
5 LIS datasets. The sample size is then extended to 405 country-level observations by applying
linear interpolations for missing observations between years of a given country. Details on the
middle-class and income measures used are provided in the three following subsections.

3.1.1 LIS: "inequality-based" measures of middle-class

We first constructed commony used definitions based on whether individuals' incomes fall (i)
between the 2nd and fourth quintile (2to4) or (ii) within the 3rd quintile of the income distribution
(3). For simplicity, we refer to these measures as being *inequality-based*. More specifically, we
measure middle-class as the percentage of income within the second to fourth quintile of the
population's income distribution. Similarly, we measure middle-class' inequality using only the
income shares within the third quintile of the income distribution. The thresholds are chosen by
referring to the previous literature and mentioned in the introductory section of the paper.

3.1.2 LIS: 'size-based" measures of middle-class

Second, we measure middle-class "size" in term of the proportion of the observations (population-weighted) of the sample within predetermined income brackets. In particular, we determine the income bracket using median income as a reference. We then calculate a "small-size" (S) measure as the percentage of population within 75% and 125% of the median income. We then use the same methodology to calculate "big-size" (B), reporting the percentage within 60% and 250% of the median income. Although upper bounds are more challenging to identify, the lower limits, 75% or 60% of the median income, find quite a common agreement as threshold points between middle-class and poverty (Atkinson and Brandolini, 2013).

3.1.3 LIS: income types and normalization criteria

Given the importance of measuring the effects of different sources of income, we take advantage of the high-quality, and fine-grained information provided by LIS, which enables us to (i) use different types of income and (ii) using alternative equalization factors for household's size.[9]

First, we use three measures of income types throughout the paper, which we obtained by following the LIS guidelines.[10]

1. Labor income (HIL), directly available from LIS.

2. Market income (MI), derived as:

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[9] We also extrapolated definitions based on population's segments according to age classes. We do not report such results, as they do not add much to the evidence obtained by using the whole population.
[10] To avoid unnecessary complications, variables' names throughout follow LIS labelling methodology.

$$market\ income\ (mi) = factor\ income\ (hic + hil) + hitp$$

where *hic* means income from capital, and *hitp* are private transfers. These last

two are directly available from LIS.

3. Disposable income (DHI), calculated as:

$$dhi = mi\ (hil + hic + hitp) + hitsi + hitsu - hxit + hitsa$$

where: *hitsi* are transfers from social insurance, *hitsu* are transfers from

universal benefits; *hitsa* represent transfers for social assistance; finally, *hxit*

are tax payments. Again, all of these directly available from LIS.

Second, we define the variables depending on income measured at:

1. the household level (RAW), per household component

2. by dividing by full household size (PC)

3. by only partially counting household's size and using the parameter 0.5[11] as

equivalizing factor (EQ) for household's size.[12]

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[11] 0.5 being the factor suggested in LIS guidelines.
[12] All measures were obtained also by (i) applying top-bottom coding - greater than zero, and less or equal ten times the median value of the distribution - to the income data, and by (ii) using the observations' appropriate population weights to report to one country's population in adherence with the LIS guidelines. It is worth noting; pension payments are excluded in all measures.

3.2 Measures of self-reporting and class self-perception from IVS

Another source of microdata, which allows building middle-class measures, are from the Integrated Values Study (IVS). IVS is obtained by merging the World Value Survey (WVS) and the European Values Study (EVS). The first variable employed, available both from the WVS and EVS, is variable X047 "Scales of Incomes" asking the respondents to self-classify themselves into a deciles-scale from one (lowest step) to ten (highest). In this way, and taking into account the problems stemming from self-classification, we compute the percentage of respondents by a country that self-classify within the third quintile, or the second to fourth quintile of the income distribution. This measure is consistent with a subjective size-based measure of middle-class, though we had to adopt a different methodology than in LIS, because we do not have measures of median income in this case. In doing this, we obtain 307 measures for countries and different years, interpolating the missing ones according to the LIS sample, and building 405 country-year observations.

A second strategy has been utilizing variable X045 "Social Class Subjective," a variable spanning from value 1 "Belonging to the upper class," to 5 "Lower Class." In this case, we build two measures of the middle-class. The first considers only the percentage of respondents self-classifying as "Upper Middle-class," and another summing the percentages of those self-classifying both as "Upper Middle-class" and "Lower Middle-class." Here, we ended up with only 207 country aggregates because this question is available in WVS but not in EVS, and again, reported to the 405 observations sample through linear interpolation.

3.3 Measures of recessions

To measure fluctuations in unemployment directly associated with the Great Recession we

follow Keegan al. (2013) and quantify the unemployment change in the recessionary period 2007- 2009. The identification of a recession is computed from quarterly growth-rates of seasonally adjusted GDP from the OECD dataset to create the recession and recession's derived variables. In particular, rates are calculated by following the GPSA method, i.e., the quarter-to-quarter growth-rate method.

Following the official definition, a recession is identified from a dummy variable which equals to 1 if country i in year j experienced two or more consecutive quarters of negative growth. From the recession variable, we computed categorical variables for:

1. Depth (DE): this was first calculated as the absolute value of the average negative growth rate of the recessive wave. This variable was then codified in three categories depending on the growth rate being between 0 and 2.5, 2.5 and 5, and above 5.

2. Duration (DU): this measures the number of consecutive quarters of negative growth. This variable was then codified in five categories depending on the growth rate belonging to the intervals (0,1], (1,4], (4,7], (7,10], and strictly above ten quarters.

We also created a dummy variable Great Recession (GR), a dummy capturing the period 2006-2008 as the onset of the Great Recession. This variable, interacted with the recession dummy, helps in singling out all recessions happened within the Great Recession wave.

3.4 Control variables

Given that other alternative effects can influence the size of the middle class, we consider some control variables. More specifically, we control for per capita GDP (PcGDP) given that the size of the middle class might be a normal good increasing with a country's wealth. Higher average-income countries have more resources available to invest in institutions and welfare programs that reduce inequality. Indeed, some work shows evidence of a negative association between changes in Gini and median income (Thewissen et al., 2018). Some demographic characteristics as the population size (POP) are found to correlate negatively with inequality (Campante and Do, 2007). The percentage of the female population (F) also has been found to influence inequality, both from a lower propensity to being in the labor market, as well as different attitudes towards inequality. Other covariates include also the percentage of labor force owning a secondary and tertiary degree concerning the overall population (EDU), which captures the effect of human capital on being middle-class, though the evidence on the impact on inequality is not well established, and it depends on the return to education (Goldin and Katz, 2007). Finally, the age dependency ratio (ADR) captures the share of the population active in the labor market who produce income. All these controls could provide independent explanations for a change in the size of the middle-class, and have the potential to control for omitted variable bias in our estimates.

[Insert Table 1 – Descriptive Statistics - about here]

4 Empirical strategy

We draw on the country and year specific variation in middle-class size as our baseline linear specification, which makes up of a panel of OECD countries.

4.1 Baseline estimates

In our baseline model, the independent variable(s) is (are) MC_{it}^{j} defined as middle-class' measure j in country i at time t, and regressed on the unemployment rate variable U_{it}, on the recession dummy R_{it}, and on their interaction, $U_{it} \times R_{it}$. Equations 1.1 to 1.3 show, respectively, the use of the recession dummy (equal to 1 if there has been at least one recessive quarter during the year), and of the categorical variable measuring duration (variable DU in specification 1.2) and depth (variable DE in specification 1.2) of the recession whose definitions have been provided before in the text.

$$MC_{it}^{j} = \beta_0 + \beta_1 U_{it} + \beta_2 R_{it} + \beta_3 (U \times R)_{it} + \mathbf{\Phi'X_{it}} + \mu_i + \tau_t + \varepsilon_{it} \tag{1.1}$$

$$MC_{it}^{j} = \beta_0 + \beta_1 U_{it} + \beta_2 DU_{it} + \beta_3 (U \times DU)_{it} + \mathbf{\Phi'X_{it}} + \mu_i + \tau_t + \varepsilon_{it} \tag{1.2}$$

$$MC_{it}^{j} = \beta_0 + \beta_1 U_{it} + \beta_2 DE_t + \beta_3 (U \times DE)_{it} + \mathbf{\Phi'X_{it}} + \mu_i + \tau_t + \varepsilon_{it} \tag{1.3}$$

The term $\mathbf{\Phi'X_{it}}$ is a vector including the set of control variables described in the previous section; finally, μ_i and τ_t are, respectively, country and year dummies. Throughout the paper we use robust standard error estimation.

<div align="center">

[Insert Table 2 – Baselines - about here]

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Table 2 reports the results for specifications 1.1 to 1.3, where we use different definitions of middle-class and income from the LIS data. For space reasons, we omit the reporting of the coefficient obtained for the control variables. We first consider the definition of middle-class as the percentage of income within the second to fourth quintile of its distribution. In particular, the panel A reports a set of nine results where the first three columns draw on the raw definition of disposable household income (DHIRAW) the following three on equivalised income (DHIEQ),

and the remaining on per-capita income (DHIPC) respectively. As in column (1), the estimated coefficient of unemployment U on the middle-class' size is -0.16 (significant at the 1% level) indicates that a one percentage point increase in unemployment is associated with a reduction of -0.16% of income accruing to the middle-class. Estimates for the recession dummy R and the interaction variable obtained by interacting recessions with unemployment rate, variable $U \times R$, are instead not significant. We thus find that, while recessions do not seem to be significantly associated with middle-class size, when shifting from the raw definition of disposable household income to the equivalised (column 2) and the per-capita (column 2 ones), we still obtain a negative and 1% significant negative association between unemployment and middle-class. It is important to note that the size for the equivalised version is reduced (from 0.16 to 0.09) and instead magnified when using the per-capita version (from 0.16 to 0.19). Another important difference between the regression in column (1), and those in columns 2 and 3, is that the interaction $U \times R$ becomes larger and significant at 5% level in column 2 and 1% level in column (3). In particular, the estimated coefficient of 0.02 in column 1 increases to 0.06 in column 2 and 0.16 in column 3. One way to read this positive interaction is that the negative effect of unemployment on middle-class' tends to be weaker in years when recessions hit, likely for the more or less automatic enactment of social stabilizers. Table 3 explores this possible mechanism further by making use of social protection spending data.

Columns 3 to 6 consider labor income (HIL) instead of disposable income (DHI). Here, we record a strikingly stronger and highly significant and negative association of unemployment on middle-class', size which goes, respectively, from -0.16 to -0.6 for the raw definition of income, from -.0.09 to -0.61 for the equivalised version, and from -0.19 to -0.51 when the average household's member income is considered. As these results might seem intuitive, it is worth noting that, to our knowledge, empirical evidence of this type was not provided in previous

literature, as only drawing from LIS data allowed us to test this stark difference between disposable and labor income. Clearly, this shows that is not a general middle-class squeezing effect from unemployment that is predominant, but one where middle-class status has been reached mainly through labor income.

The last three columns report the same set of specifications when market income (MI) is considered. The result is an almost equivalent reversal of what found when using labor income definition in that we assist to estimates' shift from -0.60 to 0.62 for RAW measures, -0.61 to 0.62 for the specification using the EQ measure, and -0.51 to 0.53 when the PC definition is used. Results in panel A seems to be qualitatively equivalent and robust also in panel B (columns 10 to 18), where we shift from a definition of percentage income within the second to the fourth quintile to one considering only the percentage in the third quintile of the income distribution. However, in this case, the negative association of unemployment seems to be weaker in size when considering DHI and HIL incomes, as well as for the smaller and positive association with MI.

Panel C reports six additional specifications (columns 19 to 24) where the middle-class is measured as the percentage of the population that falls in two different income brackets. For space reasons, we show only the results for the EQ version of household income. Column 19, for example, reports the results obtained when using the EQ definition of DHI when recurring to the broader definition of middle-class. We recall, 'large' indicates that we set the brackets as between 60% and 250% of the median income of the distribution. In contrast, 'small' indicates brackets between 75% and 125%. For these panels, results are quite different from those obtained in A and B. First of all, unemployment has a positive effect on the percentage of people in the pre-designed brackets. This is especially evident and highly significant when considering

column 19, where the positive association between U and the DHIEQ (Large) definition of middle-class is 0.6 (1% significant). This indicates that one more percentage point of unemployment is associated to a increase of 0.6% persons in the middle-class. The only exception to this common trend is column 22, where unemployment is negatively associated with HILEQ (Small). Overall, the results obtained when utilizing this definition of middle-class' size seem to be less convincing, both for lack of significance and consistency of the results across several specifications. Part of the reason can be based on the fact that, when the percentage of the sample within a predefined income bracket is utilized, there may be counterbalancing effects as people being in the middle-class falling far below the median and thus outside the bracket, are accompanied by people falling at the same time from the upper class to the middle, resulting in an undecided effect on the percentage.

We finally turn to panel D of Table 2, showing results obtained when using middle-class' measures from IVS. As explained before in the data section, we have two different measures. One (MCPPERC and MCPERC2) is constructed by looking at how respondents classify themselves as belonging to an upper class, upper middle-class, middle-class, lower middle-class, and working class. For robustness, we report two different measures, one including lower-middle-class and one excluding a respondent who self-located into a lower-middle-class outside the calculation of the percentage respondents self-locating into the middle-class. Another measure MCSLS3 and MCSL2to4 recurs to self-location in income deciles and computing the percentage respondents into the derived quintiles. Results are like the ones obtained when using the income percentages definitions, with negative association of U and positive association with the interaction $U \times R$[13].

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[13]However, the interpretation of these results cannot be the same in that the middle-class measures obtained by using the IVS data count the percentage respondents identifying themselves as middle-class, and are thus more conceptually similar to a measure of middles class' size based on percentage population within a predetermined income bracket.

4.2 The effect of the Great Recession

We then consider the middle-class' effects experienced by countries within the onsetting wave of the Great Recession. That is, we created a dummy variable equal to one for the years between 2006 and 2008 to capture the differential effects of those recessions occurred at the onset of the Great Recession (GR). This is done by creating an interaction variable, $GR \times R$.

We also extend to the full set of double interactions by including the interaction $GR \times U$, capturing the differential effect of unemployment at the onset of the Great Recession. The new specification that we test is shown in equation 2 below. As we did for the baselines, all regressions are also run by using the categorical variables measuring depth (DE) and duration (DU) of recessions. As in the baselines, we do not report the results obtained by using duration and depth, which are consistent with what found when using the simple recessive dummy. For space reasons this time we also only report the results using the equivalised measures of income while the full set of results which we make available and not for publication in a related appendix to this paper, show similar trends than the ones displayed in Table 1.

$$MC_{it} = \beta_0 + \beta_1 U_{it} + \beta_2 R_{it} + \beta_3 (U \times R)_{it} + \beta_4 (GR \times U) + \beta_5 (GR \times R)$$
$$+ \mathbf{\Phi}' X + \mu_i + \tau_t + \varepsilon_{it}$$

(2)

[Insert Table 3 about here]

The results in Table 3, panels A and B, show that most of the dynamics estimated in Table 2 regarding unemployment effects on the size of middle-class measured as income shares within predetermined quintiles of the income distribution are similar in size, sign, and significance. However, there is a relevant novelty when introducing the full set of double interactions which

is now possible. This is true when referring to HIL and column 6 in panel A and its twin estimate in panel B, considering only income shares within the third quintile. Here, we see that, while the estimates referring to recessions alone still do not present a significant association, the coefficients estimated for the interactions $GR \times R$ and $GR \times U$, show a significant and negative association. The results regarding the first of the two interactions as to be interpreted as if, while recessions in general do not seem to be negatively associated with middle-class sizes, those picked by the specific period referred as Great Recession, present indeed a negative and sizable association and are statistically significant. This, being the coefficients quite large, especially when considering middle-class as income shares within the second to fourth quintile of the income distribution. Here the coefficient (equation 6 in panel A of Table 3) of -4.19 (significant at 10% level) shows that a recession occurred within the 2006 and 2008 period, is associated, on average, to a -4.2% shrinking in middle-class size. There is a change between equation 6 in panel A and the one in panel B in that the latter shows a smaller effect of -1.6 (10% significant) but in our opinion still relevant negative association. Also, referring to equation 6 in panel B, the estimated coefficient for the interaction variable $GR \times U$ is negative and significant at 5% level. In particular, this indicates that, while confirming the negative association of unemployment with measures of middle-class, this effect tends to be quite larger when focusing on unemployment rates during the onset of the Great Recession. Overall, results are more significant when considering labor income (HIL) instead of disposable household income (DHI), showing a regularity in the patterns observed in the baseline estimates. Moreover, also within the interaction-extended models, size and sign are consistent and comparable. This also shows that the association between unemployment and recession is particularly negative during the years referred to as the Great Recession, and such evidence is stronger for labor income than disposable income. Our evidence seems to match a diffused view that the Great Recession has been positively correlated with a shrinking of the middle-class, while showing that this was not

true for recessions in general. Support instead for the role of unemployment seems to be more consistent all through the different models run with and without GR interactions, showing again, however, that its association has been stronger during the 2006-2008 period. We then rerun similar regressions when using a measure of the size of the middle-class (panels C1 and C2), and self-reported collocations from the IVS data (panel D).

4.3 Social protection and unemployment protection

The results reported in Table 2 show that one possible mechanism through which recessions and unemployment affect the middle-class' size is through the mediating effect of social protection institutions. While this intuition has already been anticipated in the introductory section of this paper, we test here for potential mediating factors from social protection institution. We draw upon data on social spending and finally turn to our last set of results extending the baseline model with another set of interactions aiming at capturing these mediating effects. Specifically, Table 4 runs a similar battery of tests showing two additional covariates obtained by interacting both the recessionary treatment with a social security dummy created from the distribution of total social/unemployment spending as a percentage of GDP and available from the OECD database.

Equations 3.1 and 3.2 below show the specification of the model obtained by adding the $SP50$ or $UP50$ dummies, and the two additional interaction effects derived from interacting social spending with both unemployment U and recession R, namely variables $(SP50 \times U)_{it}$ and $(SP50 \times R)_{it}$.

$$MC_{it}^{j} = \beta_0 + \beta_1 U_{it} + \beta_2 R_{it} + \beta_3 (UxR) + \beta_4 SP50_{it} + +\beta_5 (SP50 \times R)_{it} + \beta_6 (SP50xU)_{it} \qquad (3.1)$$
$$+\mathbf{\Phi}'\mathbf{X} + \mu_i + \tau_t + \varepsilon_{it}$$

$$MC_{it}^{j} = \beta_0 + \beta_1 U_{it} + \beta_2 R_{it} + \beta_3 (UxR) + \beta_4 UP50_{it} + + \beta_5 (UP50 \times R)_{it} \quad \text{(3.2)}$$
$$+ \beta_6 (UP50xU)_{it} + \mathbf{\Phi'X} + \mu_i + \tau_t + \varepsilon_{it}$$

It is important to bear in mind that the dummy $SP50_{it}$ is constructed by setting it equal to one if the percentage of social spending as percentage of a country's GDP in a specific year is at or above the median value of the overall dataset distribution; the same procedure is applied when considering unemployment spending, dummy variable $UP50_{it}$. Our approach is mainly indicated for testing larger differences which are more adequate to detect structural mediating effects on middle-class size, as it is likely that middle-class squeezing emerges more likely with persistent and structural social – and in particular unemployment - underinsurance.

[Insert Table 4 about here]

Once again, we limit the display of the results to equivalised measures and considering only the recessive dummy. The most interesting findings, perhaps, stem from panel A2 of table 4, where the unemployment protection dummy is used. First, the large and highly significant and negative association of the unemployment dummy can be read as if societies with shares of income (both disposable and labor) concentrated in the middle need less unemployment protection spending. Second, we find a significant and positive association regarding the $U \times UP50$ dummies, showing that the negative association between unemployment and middle-class' measures found throughout the paper is mitigated by unemployment spending, giving some evidence of the protective effect of social spending, and unemployment spending, on middle-class' size.

5 Conclusion

This paper examines the effect of employment and recessionary shocks on the size of the middle-class across a set of definitions and measures for middle-class. Specifically, we draw from both income and self-perceived measures of middle-class. Overall, and by using several econometric specifications and middle-class definitions, we do not find a statistically significant squeezing effect of an unemployment shock during a recession. However, the latter finding does not apply when we examine the impact of the Great Recession. Indeed, we do find a squeezing effect of the middle-class' size measures based on labor income shares and during the onset of the Great Recession, which is regarded as an unanticipated employment shock.

Moreover, we find that the middle-class squeeze is mitigated if recessions hit at higher levels of unemployment. A similar effect is detected for top unemployment insurance spending countries, this being consistent with the expected impact of partial unemployment insurance. Importantly, we find also that unemployment shocks during recessions increase the share of the population that defines itself as 'middle-class.' This result suggests that an employment shock might increase the salience of the fragility of employment. The latter effects increase the likelihood of those individuals at the top end of the income distribution to view themselves as middle-class, given the higher threshold income for middle-class belonging.

Our results show also that the middle-class size squeeze is sensitive to the definitions of middle-class used, but not to alternative measures of recessions when accounting for their length and duration. Our interpretation is that recessions exert heterogeneous effects across the income distribution, driving people from middle-class to the lower income groups, while at the same time driving people of high income towards the middle, with the overall effect of having a

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stable percentage of people in the predefined middle-class. Our results are at least consistent with this explanation.

Furthermore, the self-reported belonging to a social class is found to be both an inertial and less adaptive concept, and individuals might not update their self-perception immediately after an employment shock that reduces their income. The effect appears to be partially mediated by the effect of social protection institutions, and it was notably larger during the Great Recession, and when using unemployment protection instead of measures of social security at large.

The paper has important implications for policymaking. It suggests that, if governments wish to attain desirable policy objectives traditionally associated with middle-class' size – like innovation, democratic stability, and human capital accumulation - only income losses resulting from unanticipated employment shocks, such as those emerging after the Great Recession, are a cause of concern. This is true especially for those targeting labor income losses, more than overall income. In particular, we observe that such effects occurred during the Great Recession, and were generally accompanied by welfare spending cuts.

Another significant result for policy processes is that mechanisms of income protection in the form of unemployment insurance seem to attain their goals of protecting individuals against unexpected unemployment shocks, and hence ensure both the socio-economic stability, and consumption smoothing of the middle-class over over time. Further studies might want to explore more e in depth why 'this time was different', i.e., why only recessions within the Great Recession's wave were the ones which have been producing a squeezing effect, as our evidence does not support this to be the case in general.

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Table1. Descriptive Statistics

Variable Definition	Variable Label	N	Mean	SD	Min	Max	Source
Middle-Class Measures							
Income-based	Label						
q2to4 Dhi(Equivalised)	DHIEq2to4	405	59.43	2.640	50.17	66.52	LIS
q2to4 Hil (Equivalised)	HILEq2to4	405	57.42	6.830	10.98	63.59	LIS
q3 Dhi(Equivalised)	DHIEq3	405	19.68	1.250	15.07	23.79	LIS
q3Hil (Equivalised)	HILEq3	405	19.06	2.430	3.630	23.02	LIS
Small Size DhiEq.(Disposable Income)	DHIEq (Small)	405	38.18	6.880	16.11	51.32	LIS
Small Size Hil Eq. (Labor Income)	HILEq (Small)	405	29.10	3.520	17.81	37.01	LIS
Big Size Dhi Eq.(Disposable Income)	DHIEq (Large)	405	76.65	9.780	37.27	90.67	LIS
Big Size Hil Eq. (Labor Income)	HILEq (Large)	405	66.81	7.690	35.96	84.31	LIS
Non-income based							
Midclass Perception	MCPerc	405	76.85	15.54	32.02	89.61	WVS
Midclass Perception (2)	MCPerc2	405	55.03	16.09	20.88	68.70	WVS
Midlcass Self-Loc. in 3rd Quintile	MCSL3	405	26.47	14.95	0.980	64.21	IVS
Midlcass Self-Loc. in 2nd to 4th Quintile	MCSL2to4	405	68.96	17.96	15.05	96.71	IVS
Recession Measures							
Recession (R)	R	405	0.200	0.400	0	1	OECD
Duration	DU	405	0.300	0.690	0	4	OECD
Depth	DE	405	0.210	0.430	0	2	OECD
Unemployment	U	405	8.130	4.040	1.9	24.8	OECD
Great Recession	GR	405	0.160	0.370	0	1	OECD
Controls							
GDP PC	GDP	405	10.42	0.350	9.420	11.41	OECD
Female (%)	F	405	50.99	0.530	49.85	52.52	OECD
Population	POP	405	9.440	1.320	5.970	12.56	OECD
Age Dependency Ratio	ADR	405	22.77	3.520	15.60	31.53	OECD
Education	EDU	405	74.57	12.58	31.60	94.40	WB-WDI
Social Protection (SP)	SP	404	0.780	0.410	0	1	OECD
Unemployment Protection (UP)	UP	405	0.590	0.490	0	1	OECD

Notes on sources: LIS - Luxembourg Income Study - http://www.lisdatacenter.org/.IVS - Integrated Values Survey: obtained by appending observations from the European Values Study (EVS) and the World Values Survey (WVS); EVS - http://www.europeanvaluesstudy.eu/; WVS - http://www.worldvaluessurvey.org/.OECD - Organization for Economic Co-operation and Development - http://stats.oecd.org/. CPDS - Comparative Political Data Set - http://www.cpds-data.org/.WDI - World Bank's World Development Indicators - http://data.worldbank.org/data-catalog/world-development-indicators.

Table 2. Baseline results

(A) Inequality. Middle-class and % Income within 2nd to 4th quintile of the income distribution. From LIS database.

DEPVARS	(1) DHIRAW	(2) DHIEQ	(3) DHIPC	(4) HILRAW	(5) HILEQ	(6) HILPC	(7) MIRAW	(8) MIEQ	(9) MIPC
U	-0.16***	-0.09**	-0.19***	-0.60***	-0.61***	-0.51***	0.62***	0.62**	0.53**
	(0.04)	(0.04)	(0.04)	(0.19)	(0.17)	(0.16)	(0.21)	(0.24)	(0.21)
R	0.24	-0.11	-0.82	-1.46	-1.79	-2.28*	0.16	1.33	0.73
	(0.54)	(0.40)	(0.50)	(1.55)	(1.43)	(1.35)	(1.91)	(2.26)	(2.05)
U x R	0.02	0.09**	0.16***	0.06	0.09	0.13	-0.05	-0.12	-0.05
	(0.05)	(0.04)	(0.05)	(0.17)	(0.15)	(0.14)	(0.17)	(0.20)	(0.18)
R-squared	0.82	0.78	0.70	0.50	0.52	0.48	0.53	0.47	0.50

(B) Inequality. Middle-class and % Income within 3rd quintile of the income distribution. From LIS database.

	(10) DHIRAW	(11) DHIEQ	(12) DHIPC	(13) HILRAW	(14) HILEQ	(15) HILPC	(16) MIRAW	(17) MIEQ	(18) MIPC
U	-0.06***	-0.07***	-0.05**	-0.23***	-0.22***	-0.19***	0.19***	0.21**	0.18**
	(0.02)	(0.02)	(0.02)	(0.07)	(0.06)	(0.05)	(0.07)	(0.08)	(0.07)
R	0.05	-0.26	-0.15	-0.54	-0.68	-0.77	0.23	0.83	0.74
	(0.31)	(0.23)	(0.24)	(0.61)	(0.55)	(0.49)	(0.63)	(0.86)	(0.82)
U x R	0.02	0.06**	0.03	0.04	0.06	0.06	-0.03	-0.04	-0.03
	(0.03)	(0.03)	(0.02)	(0.07)	(0.06)	(0.05)	(0.06)	(0.07)	(0.07)
R-squared	0.78	0.77	0.73	0.52	0.52	0.54	0.62	0.51	0.55

(C) Size. Middle-class and % population between 75% and 125% of median income (small), and 60%-250% (large). From LIS database.

	(19) DHIEQ (LARGE)	(20) DHIEQ (SMALL)	(21) HILEQ (LARGE)	(22) HILEQ (SMALL)	(23) MIEQ (LARGE)	(24) MIEQ (SMALL)
U	0.62***	0.13	0.27*	-0.18***	0.38**	0.07
	(0.16)	(0.09)	(0.15)	(0.05)	(0.19)	(0.13)
R	1.71	0.66	2.34*	0.56	1.88	1.55
	(1.62)	(0.87)	(1.37)	(0.42)	(1.78)	(1.29)
U x R	-0.25*	-0.04	-0.31**	-0.04	-0.16	-0.05
	(0.15)	(0.08)	(0.14)	(0.05)	(0.19)	(0.13)
R-squared	0.67	0.77	0.56	0.81	0.49	0.62

(D) Middle-Class Perception and self-reported size: From WVS and IVS.

	(1) MCPERC.	(2) MCPERC2	(3) MCSL3	(4) MCSL2TO4
U	-0.31*	-0.34*	-0.49**	-1.05***
	(0.17)	(0.20)	(0.21)	(0.35)
R	-3.70*	-5.77**	-3.70**	-2.29
	(2.15)	(2.79)	(1.83)	(2.38)
U x R	0.54*	0.81**	0.67***	0.64**
	(0.30)	(0.37)	(0.21)	(0.29)
Observations	405	405	405	405
R-squared	0.94	0.92	0.85	0.77

Notes: Sample size = 405. DHI = Disposable Household Income, HIL = Labor Income; MI = Market Income. Raw = Raw measure; Eq = Equivalised measure (factor used 0.5). Pc = Per capita Measure. U = Unemployment rate; R = recession dummy. All controls, country and year dummies included. Controls are: We also control for per capita GDP, demographic characteristics (population POP, the percentage of female population F, the percentage of labor force owning a secondary and tertiary degree concerning the overall population EDU, age dependency ratio ADR). MC Perc and MC perc 2 are measures of middle-class perceptions. MC perc 2 differs from MC Perc because the category "Lower Middle-class" from var X045 of WVS is not considered. MC Size 3 and MC Size 2 to 4 are measures of the percentage of respondents self-locating in middle-class according to self-reported income deciles in WVS and

Table 3. The Effect of the Great Recession

(A) Inequality. Middle-class and % Income within 2nd to 4th quintile of the income distribution. In all cases, equivalised (Eq) measures are reported.

VARIABLES	(1) DHI2TO4	(2) DHI2TO4	(3) DHI2TO4	(4) HIL2TO4	(5) HIL2TO4	(6) HIL2TO4
U	-0.07*	-0.07*	-0.10***	-0.57***	-0.58***	-0.61***
	(0.04)	(0.04)	(0.04)	(0.16)	(0.16)	(0.18)
R	0.62**	0.61**	-0.31	0.04	0.02	-0.69
	(0.26)	(0.26)	(0.46)	(0.75)	(0.76)	(1.37)
U × R			0.11**			0.08
			(0.05)			(0.15)
GR × R	-0.17	-0.16	0.14	-4.81**	-4.78**	-4.54*
	(0.53)	(0.52)	(0.52)	(2.34)	(2.32)	(2.37)
GR × U		-0.07	-0.12		-0.51**	-0.55**
		(0.08)	(0.07)		(0.26)	(0.25)
R-squared	0.78	0.78	0.78	0.52	0.53	0.53

(B) Inequality. Middle-class and % Income within 3rd quintile of the income distribution. In all cases, equivalised (Eq) measures are reported.

VARIABLES	(1) DHI3	(2) DHI3	(3) DHI3	(4) HIL3	(5) HIL3	(6) HIL3
U	-0.04**	-0.05**	-0.07***	-0.19***	-0.19***	-0.21***
	(0.02)	(0.02)	(0.02)	(0.06)	(0.06)	(0.06)
R	0.26*	0.26*	-0.35	0.25	0.24	-0.27
	(0.14)	(0.14)	(0.27)	(0.30)	(0.30)	(0.56)
U × R			0.07***			0.06
			(0.03)			(0.06)
GR × R	-0.13	-0.13	0.07	-1.84**	-1.83**	-1.66**
	(0.29)	(0.28)	(0.28)	(0.81)	(0.80)	(0.81)
GR × U		-0.02	-0.05		-0.17*	-0.19**
		(0.04)	(0.04)		(0.09)	(0.09)
R-squared	0.76	0.76	0.77	0.53	0.53	0.53

Notes: Sample size = 405. DHI = Disposable Household Income, HIL = Labor Income; MI = Market Income. Raw = Raw measure; Eq = Equivalised measure (factor used 0.5). Pc = Percapita Measure. U = Unemployment rate; R = recession dummy. All controls, country and year dummies included. Controls are per capita GDP (PCGDP), and other demographic characteristics (population POP, the percentage of female population F, the percentage of labor force owning a secondary and tertiary degree concerning the overall population EDU, age dependency ratio ADR). MCPerc and MCperc2 are measures of middle-class perceptions. MCperc2 differs from MCPerc because the category "Lower Middle-class" from var X045 of WVS is not considered. MCSL3 and MCSL2to4 are measures of the percentage of respondents self-locating in middle-class according to self-reported income deciles in WVS and EVS (IVS). Robust standard errors in parenthesis. *p < 0.1; **p < 0.05; ***p < 0.01.

Table 3 (continued). Great Recession Effects – MC Size and Perception

Size. Middle-class and % population between 75% and 125% of median income (small), and 60%-250% (large)
Disposable Household Income (DHI) and Labor Household Income (HIL). Equivalised measures used.

C1	(1)	(2)	(3)	(4)	(5)	(6)
			Size - DHI (Equivalised)			
SIZE	LARGE	LARGE	LARGE	SMALL	SMALL	SMALL
U	0.55***	0.54***	0.60***	0.11	0.10	0.11
	(0.15)	(0.15)	(0.16)	(0.08)	(0.08)	(0.09)
R	-1.02	-1.01	0.59	0.15	0.16	0.39
	(1.14)	(1.14)	(1.97)	(0.65)	(0.65)	(1.09)
GR x R	3.51**	3.52**	2.95	0.79	0.81	0.73
	(1.62)	(1.64)	(1.80)	(0.91)	(0.91)	(1.01)
U x GR		-0.17	-0.17		-0.27**	-0.27**
		(0.22)	(0.22)		(0.13)	(0.13)
U x R			-0.19			-0.03
			(0.16)			(0.09)
R-squared	0.67	0.67	0.67	0.77	0.77	0.77

(C2)	(1)	(2)	(3)	(4)	(5)	(6)
			Size - HIL (Equivalised)			
SIZE	LARGE	LARGE	LARGE	SMALL	SMALL	SMALL
U	0.18	0.16	0.25*	-0.20***	-0.20***	-0.19***
	(0.14)	(0.14)	(0.15)	(0.05)	(0.05)	(0.05)
R	-0.65	-0.63	1.75	0.25	0.25	0.58
	(1.01)	(1.01)	(1.67)	(0.33)	(0.33)	(0.50)
GR x R	2.37	2.39	1.55	0.08	0.09	-0.03
	(1.58)	(1.57)	(1.68)	(0.63)	(0.62)	(0.64)
U x GR		-0.28	-0.27		-0.04	-0.03
		(0.19)	(0.20)		(0.08)	(0.08)
U x R			-0.28*			-0.04
			(0.15)			(0.05)
R-squared	0.56	0.56	0.56	0.81	0.81	0.81

(D) Middle-Class Perception and self-reported size From WVS and IVS

(D)	(1)	(2)	(3)	(3)
VARIABLES	MCPERC	MCPERC2	MCSL3	MCSL2TO4
U	-0.30*	-0.32*	-0.50**	-1.10***
	(0.17)	(0.19)	(0.22)	(0.36)
R	-3.58	-6.27*	-4.31**	-4.13
	(2.45)	(3.23)	(2.18)	(2.71)
GR x R	-0.32	1.27	1.60	4.86
	(1.22)	(1.64)	(1.87)	(3.12)
U x GR	0.29	0.49*	-0.11	-0.57
	(0.21)	(0.27)	(0.22)	(0.45)
U x R	0.53*	0.83**	0.71***	0.74**
	(0.31)	(0.39)	(0.22)	(0.29)
R-squared	0.94	0.93	0.85	0.77

Notes: DHI = Disposable Household Income, HIL = Labor Income.. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = Unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. DHI = Disposable Household Income, HIL = Labor Income.. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy.

Table 4. The Effect of social (SP50) And Unemployment Protection (UP50) on "Inequality" based measures of the middle-class.

Panels A1 and A2"Inequality." Middle-class and % Income within 2nd to 4th quintile of the income distribution. Equivalised measures used throughout. Panels B1 and B2"Inequality." Middle-class and % Income within the 3rd quintile of the income distribution. Equivalised measures used throughout

Social Protection

(A1) VARIABLES QUINTILES	(1) DHI2TO4	(2) HIL2TO4	(3) DHI3	(4) HIL3
U	-0.15**	-0.56***	-0.07**	-0.22***
	(0.07)	(0.19)	(0.03)	(0.07)
SP50	-0.18	1.85	0.14	0.72
	(0.62)	(2.06)	(0.31)	(0.75)
U x SP50	0.05	-0.08	0.00	-0.01
	(0.07)	(0.22)	(0.03)	(0.08)
R	-0.30	-5.23***	-0.75*	-1.45**
	(0.69)	(1.98)	(0.43)	(0.71)
U x R	0.08*	0.12	0.07**	0.07
	(0.04)	(0.16)	(0.03)	(0.06)
SP50 x R	0.22	3.43**	0.49	0.75
	(0.65)	(1.52)	(0.41)	(0.56)
R-squared	0.78	0.53	0.77	0.53

Unemployment Protection

(A2) VARIABLES QUINTILES	(5) DHI 2TO4	(6) HIL 2TO4	(7) DHI Q3	(8) HIL Q3
U	-0.21***	-0.78***	-0.10***	-0.30***
	(0.05)	(0.19)	(0.02)	(0.07)
UP50	-1.56***	-5.90***	-0.48**	-2.29***
	(0.42)	(1.55)	(0.21)	(0.55)
U x UP50	0.18***	0.40**	0.05**	0.17***
	(0.05)	(0.17)	(0.02)	(0.06)
R	0.48	-2.32	-0.04	-0.78
	(0.42)	(1.74)	(0.24)	(0.65)
U x R	0.06	-0.05	0.06**	0.01
	(0.04)	(0.16)	(0.03)	(0.06)
UP50 x R	-0.57	2.70	-0.28	0.90
	(0.37)	(1.76)	(0.19)	(0.62)
R-squared	0.79	0.54	0.77	0.54

Notes: DHI = Disposable Household Income, HIL = Labor Income. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = Unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis. DHI = Disposable Household Income, HIL = Labor Income.. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = Unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis.

Table 4 (continued) The Effect of Social (SP50) And Unemployment Protection (UP50)

Panel (C1) Size. Middle-class and % population between 75% and 125% of median income (small), and 60%-250% (large). Disposable Household Incomes. Panel (C2) Size. Middle-class and % population between 75% and 125% of median income (small), and 60%-250% (large). Equivalised measures used throughout

Social Protection

(C1)	(1)	(2)	(3)	(4)
	DHI	DHI	HIL	HIL
VARIABLES	LARGE	SMALL	LARGE	SMALL
U	0.72***	-0.15	0.55***	-0.21***
	(0.23)	(0.12)	(0.21)	(0.07)
SP50	3.94*	0.51	2.03	-0.53
	(2.25)	(1.11)	(1.93)	(0.68)
U x SP50	-0.18	0.28**	-0.33*	0.03
	(0.21)	(0.12)	(0.20)	(0.08)
R	4.32**	2.18*	4.87**	1.58**
	(1.94)	(1.17)	(2.03)	(0.71)
U x R	-0.22	-0.07	-0.28**	-0.05
	(0.15)	(0.08)	(0.14)	(0.05)
SP50 x R	-3.19*	-1.56	-3.00*	-1.01*
	(1.62)	(1.00)	(1.64)	(0.57)
R-squared	0.68	0.78	0.56	0.81

Unemployment Protection

(C2)	(5)	(6)	(7)	(8)
	DHI	DHI	HIL	HIL
VARIABLES	LARGE	SMALL	LARGE	SMALL
U	0.30**	-0.14	0.15	-0.24***
	(0.15)	(0.09)	(0.16)	(0.06)
UP50	-4.40***	-4.07***	-0.81	-0.78
	(1.47)	(0.79)	(1.41)	(0.53)
U x UP50	0.51***	0.44***	0.16	0.09
	(0.16)	(0.09)	(0.15)	(0.06)
R	2.98*	1.70*	2.43*	0.59
	(1.62)	(0.88)	(1.45)	(0.51)
U x R	-0.35**	-0.13	-0.36**	-0.06
	(0.17)	(0.09)	(0.15)	(0.05)
UP50 x R	-0.81	-0.59	0.40	0.28
	(1.41)	(0.83)	(1.40)	(0.52)
R-squared	0.68	0.78	0.56	0.81

Notes: DHI = Disposable Household Income, HIL = Labor Income. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = Unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis. DHI = Disposable Household Income, HIL = Labor Income. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = Unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis.

Table 4 (Cont.) The Effect of Social (SP50) And Unemployment Protection (UP50)

(D1) Middle-Class Perception. (D2) Middle-class Based on Self-Reported Income Quintiles

Social Protection

(D1)	(1)	(2)	(3)	(4)
VARIABLES	MCPᴇʀᴄ	MCPᴇʀᴄ2	MCSL3	MCSL2ᴛᴏ4
U	0.69**	0.51**	-0.96**	-1.81**
	(0.28)	(0.23)	(0.45)	(0.80)
SP50	7.37***	6.53***	-4.42	-10.29
	(2.17)	(2.19)	(3.63)	(6.48)
U x SP50	-1.19***	-1.03***	0.58	1.00
	(0.28)	(0.27)	(0.40)	(0.66)
R	-8.77***	-12.72***	-0.04	6.94
	(3.02)	(3.90)	(3.56)	(6.38)
U x R	0.70**	0.96***	0.58***	0.45*
	(0.29)	(0.37)	(0.21)	(0.26)
SP50 x R	4.15**	6.20***	-3.19	-8.30
	(1.78)	(2.14)	(3.38)	(6.56)
R-squared	0.94	0.93	0.86	0.77

Unemployment Protection

(D2)	(5)	(6)	(7)	(8)
VARIABLES	MCPᴇʀᴄ	MCPᴇʀᴄ2	MCSL3	MCSL2ᴛᴏ4
U	-0.10	-0.13	-0.63**	-1.16**
	(0.18)	(0.18)	(0.29)	(0.54)
UP50	1.08	2.51	-6.13**	-7.73**
	(1.56)	(1.92)	(2.67)	(3.77)
U x UP50	-0.28	-0.32	0.36	0.39
	(0.18)	(0.22)	(0.27)	(0.44)
R	-3.32	-5.19*	-1.46	-0.35
	(2.22)	(2.83)	(1.97)	(2.73)
U x R	0.66*	0.94**	0.68***	0.63**
	(0.33)	(0.42)	(0.21)	(0.26)
UP50 x R	-1.83*	-2.46*	-3.40**	-2.63
	(1.00)	(1.40)	(1.73)	(2.54)

Notes: DHI = Disposable Household Income, HIL = Labor Income. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis. DHI = Disposable Household Income, HIL = Labor Income. U = Unemployment rate; R = recession dummy; GR = Great Recession Dummy. SP = Social protection dummy (=1 if country in top 50%). UP = unemployment protection dummy (1 if country in the top 50%). All controls, country and year dummies included. Robust standard errors in parenthesis.

Appendix A - Using Polarization Measures
(not for publication)

A suggested in Wolfson (1994), and furtherly elaborated in Foster and Wolfson, M. C. (2010), measures of middle-class based on income tend to be range specific, both in the "inequality" and "size" sense as we use these terms in this paper. Then a range-free definition of polarization is proposed, and the polarization index construction is then derived. Polarization P is given by:

$$P = (T - G) \times \frac{\mu}{m}$$

where T is the Relative Median Deviation of the income distribution defined as $\frac{\mu^U - \mu^L}{\mu}$, G is the Gini index of the distribution, μ, μ^U, μ^L are, respectively the mean of the overall, upper 50%, and lowest 50% of the income distribution, and m is the median of the distribution.

By using the LIS data, we could also compute polarization measures for the different income distributions (disposable, labor, and market) and use the same index in the regression framework used throughout the paper. Except for the unemployment rate, which has a significant and positive, but relatively negligible elasticity on polarization, we do not find overall significance of recessions and interaction terms. This robustness test supports our findings, as changes in more traditional middle-classes size measures seem to be influenced while polarization is not. Results are available on request.

Additional references

Wolfson, M. C. (1994) When inequalities diverge. *The American Economic Review*, *84*(2), 353-358

Foster, J. E., & Wolfson, M. C. (2010). Polarization and the Decline of the Middle-class: Canada and the US. *The Journal of Economic Inequality*, *8*(2), 247-273