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Giuseppe Bertola and Winfried Koeniger

Center for Financial Studies
an der Universität Frankfurt ▪ Mertonstraße 17-21 ▪ D-60325 Frankfurt am Main
Telefon: +49 (0)69 798-30050
Fax: +49 (0)69 798-30077 ▪ http://www.ifk-cfs.de ▪ E-Mail: info@ifk-cfs.de

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Center for Financial Studies
an der Universität Frankfurt ▪ Mertonstraße 17-21 ▪ D-60325 Frankfurt am Main
Telefon: +49 (0)69 798-30050
Fax: +49 (0)69 798-30077 ▪ http://www.ifk-cfs.de ▪ E-Mail: info@ifk-cfs.de

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Consumption Smoothing and Income Redistribution*

Giuseppe Bertola[1] and Winfried Koeniger[2]

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Abstract:
We show theoretically that income redistribution benefits borrowingconstrained individuals more than is implied by standard relative-income and uninsurable-risk considerations. Empirically, we find in international opinion-survey data that younger and lower-income individuals express stronger support for government redistribution in countries where consumer credit is less easily available. This evidence supports our theoretical perspective if such individuals are more strongly affected by tighter credit supply, in that expectations of higher incomes in the future increase their propensity to borrow.

JEL Classification: E21

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1 University of Turin

2 Institute for the Study of Labor (IZA), Bonn

1. Introduction

Government policies and market structure interact in many ways. Taxes and subsidies that smooth ex post income realizations, for example, enhance ex ante welfare when income shocks are uninsurable (Varian, 1980 and other references in Agell, 2002). This can explain a broadly negative correlation between households' financial market access, which is easier in the US and other Anglo-Saxon countries, and government interference with laissez faire income distribution, which appears more intense in European countries. Empirical assessment of such mechanisms is hampered by the difficulty of defining and measuring financial market incompleteness and redistribution policies precisely, and by the large number of different structural and institutional aspects that are potentially relevant and have been studied in the literature. In the labor market, unemployment insurance (Acemoglu and Shimer, 1999) or employment protection (Bertola, 2004) can address efficiency as well as insurance issues when financial markets are incomplete. Financing constraints are obviously relevant for efficiency of investments in physical or human capital. Perhaps less obviously, they also influence the welfare effect of redistribution policies, as in Hansen and Imrohoroglu's (1992) study of unemployment insurance with liquidity constraints and moral hazard, and they can affect socio-economic interactions at more general levels: Fogli (2000) argues that in countries where stringent employment protection legislation (EPL) implies slim job-finding chances and credit is scarcer young people may live longer with their parents than in countries where labor markets are flexible and borrowing is easy.

In this paper we focus on household credit imperfections as an empirically observable form of financial market incompleteness, and on their interaction with redistribution policies. In Section 2 we characterize theoretically the role of permanent income heterogeneity, uninsurable income volatility, and inability to borrow in determining the impact of income redistribution at the individual level. We show that redistribution, to the extent that it smoothes income and consumption intertemporally as well as across individuals, has generally more favorable welfare implications for credit-constrained individuals than for individuals who only take into account interpersonal transfers and intratemporal insurance. Empirically, this result implies that individuals who need to borrow in order to smooth their consumption benefit more strongly from redistribution when borrowing is constrained.

To seek evidence of this effect, in Section 3 we exploit cross-country heterogeneity in households' ability to obtain credit (Jappelli and Pagano, 1994) and within-country heterogeneity in individual households' inclination to borrow. Like Alesina and La Ferrara (2001), Mayda and Rodrik (2005), Boeri and Brücker (2005), and other recent studies, we use opinion-survey data to detect welfare effects at the microeconomic level. Specifically, we regress opinions regarding redistribution on interactions of relevant individual characteristics (income and age) with country-level indicators of household credit availability. Focusing on interaction effects makes it possible to control for structural and policy characteristics that are jointly endogenous at the country-level. We find that poorer individuals more strongly favor redistribution in countries where consumer credit is scarcer, and that this effect is more pronounced for young individuals. The estimated effects are statistically significant, quantitatively important, remarkably robust in various specifications. The findings are consistent with our theoretical predictions if currently low income and young age are plausibly associated with stronger inclination to borrow, in that current relative poverty is transitory and young people typically look forward to higher future lifetime income. Section 4 concludes discussing briefly how our theoretical perspective and empirical results may offer insights into more general interactions between structural and institutional features of labor and financial markets.

2. Consumption smoothing and the benefits of redistribution

We consider individuals who consume c_t in the current ($t=1$) and future ($t=2$) periods, in the presence of uncertainty and borrowing constraints. Their choice problem is maximization of

$$U = u(c_1) + E\left[v(c_2)\right], \tag{1}$$

where the increasing and concave functions $u(.)$ and $v(.)$ represent current and future discounted utility, subject to the constraints

$$c_1 - w_1 \leq w_2 - c_2 \leq \kappa \tag{2}$$

where w_1 and w_2 denote incomes in the two periods, κ is a borrowing limit, and the rate of return on assets and liabilities is set to zero for notational simplicity (the slightly more complex expressions implied by non-zero interest rates are briefly discussed in footnote 1 below). In (2), the first inequality cannot be strict if marginal utility is strictly positive, and the second holds with equality if the borrowing constraint is binding.

Maximization of (1) implies borrowing if $u'(w_1) > Ev'(w_2)$. If the borrowing constraint is not binding, $c_1 - w_1 < \kappa$, then

$$u'(c_1) = Ev'(c_2), \tag{3}$$

and the consumer borrows (saves, if negative) $b = c_1 - w_1$. If this desired borrowing exceeds the limit κ then $c_1 = w_1 + \kappa$, $c_2 = w_2 - \kappa$, and

$$u'(w_1 + \kappa) - Ev'(w_2 - \kappa) > 0 \tag{4}$$

is the shadow price of the borrowing constraint.

Disposable income coincides with consumption when the borrowing constraint binds, and reactions of unconstrained consumption to changes in disposable income have no first-order welfare impact by equation (3). Thus, the welfare effects of disposable-income perturbations can always be evaluated on the basis of the corresponding period's marginal utility of consumption, and can be decomposed in conceptually distinct components capturing level, insurance, and intertemporal smoothing effects:[1]

$$dU = u'(c_1)dw_1 + E\left[v'(c_2)dw_2\right] \tag{5}$$

$$= \frac{u'(c_1) + E\left[v'(c_2)\right]}{2}\left(dw_1 + Edw_2\right) + \operatorname{cov}\left(v'(c_2), dw_2\right) + \left(u'(c_1) - E\left[v'(c_2)\right]\right)\frac{dw_1 - Edw_2}{2}.$$

The first term in the second line of (5) captures level effects as the product of the change in total expected income, $dw_1 + Edw_2$, and average marginal utility,

[1] See the Appendix. If the rate of return on the consumer's liabilities is r, rather than zero, then

$$dU = \left(\frac{u'(c_1) + E\left[(1+r)v'(c_2)\right]}{2}\right)\left(dw_1 + E\frac{dw_2}{1+r}\right) + \operatorname{cov}\left((1+r)v'(c_2), \frac{dw_2}{1+r}\right) + \left(u'(c_1) - E\left[(1+r)v'(c_2)\right]\right)\frac{1}{2}\left(dw_1 - E\frac{dw_2}{1+r}\right)$$

and welfare effects also arise from correlation between financial returns, labor incomes, and repayment obligations. While our data do not allow us to assess their empirical relevance, Grant and Koeniger (2005) study the related issue of bankruptcy provisions' role in determining correlations between debt repayment and income shocks.

$\left(u'(c_1)+E\left[v'(c_2)\right]\right)/2>0$. Should consumption-smoothing be perfect, no other effect would be present (and averaging would be redundant, as marginal utility would be constant across realizations of second-period income and over time). If instead complete insurance is not available, the second term in (5) accounts for the welfare impact of random second-period income perturbations around their mean: these are beneficial when income increases relatively more in high-marginal-utility contingencies, so that $\operatorname{cov}\left(v'(c_2),dw_2\right)>0$. And if borrowing is constrained, so that marginal utility is not smoothed over time, the third term similarly captures the welfare effects of the timing of income perturbations.

Consider next how the intensity of income redistribution and the stringency of borrowing constraints bear on the sign and size of these expressions. Ex ante, the welfare effects of redistribution are positive in the first term of (5) for individuals who are poor enough to receive net lifetime transfers. Redistribution can also smooth ex post income randomness, to imply that the second term in (5) is positive for all risk averse uninsured individuals (Varian, 1980). Less obviously, redistribution also bears on the third term if it operates over individual lifetimes, as well as across individuals, and flattens the upward-sloping income profiles that motivate borrowing.

Redistributive schemes that reduce high incomes and increase low incomes indeed generally have a more positive (or less negative) effect on the current than on the future income of liquidity-constrained individuals, to imply that $dw_1-Edw_2>0$ when $w_1<w_2$ and desirable borrowing is frustrated by financial market imperfections. To see this, consider a specific linear scheme that entitles an individual with pre-tax income ω_i to a net

transfer $\tau(\mu - \omega_i)$. The scheme becomes more strongly redistributive as the slope parameter τ becomes larger, and taxes (subsidizes) individual *i* if his income is higher (lower) than a break-even parameter μ that may be related to mean income and to the details of the scheme's administration in ways that are not relevant to our argument. To assess the welfare implication of redistribution, note that in each period *t* disposable income of individual *i* responds to variations in τ according to $dw_t = (\mu - \omega_i)d\tau$. Then, the relevant expressions in (5) can be expressed simply in terms of the individual's first period income ω_i, of the expected income change $\Delta\omega_i$, and of the covariance between second period gross income and marginal utility.

In the first term of (5), $dw_1 + Edw_2 = 2\,(\mu - \omega_i - E\Delta\omega_i / 2)d\tau$ indicates that redistribution is more beneficial when income is lower (ω_i is smaller), but also that expected income growth (a larger $\Delta\omega_i$) tends to reduce the welfare impact of redistribution for poor individuals. To the extent that the lower income levels are associated to faster growth rates, this gives rise to the "prospect of upward mobility" (POUM) effect of Benabou and Ok (2001): since relatively poor agents are also relatively more likely to become richer, they do not favor redistribution as much as one would expect on the basis of their current situation. In the presence of uninsurable pre-tax income uncertainty, $\operatorname{cov}(v'(c_2), dw_2) = -\operatorname{cov}(v'(c_2), \omega_2)\,d\tau$ implies that a larger τ strengthens the beneficial effects of redistribution captured by the second term of (5).[2]

[2] Note that redistribution increases disposable income in bad states of the world, so

$$\operatorname{sgn}\left[\operatorname{cov}(v'(c_2), dw_2)\right] = -\operatorname{sgn}\left[\operatorname{cov}(v'(c_2), \omega_2)\right].$$

The third (and, for our purposes, crucial) term in (5) vanishes when borrowing is unconstrained. Otherwise, the inequality in (4) implies that its sign is that of

$$(dw_1 - Edw_2) = E\Delta\omega_i d\tau \,, \tag{6}$$

and its absolute size is unambiguously related to the borrowing limit κ: when the borrowing constraint is binding, $dc_1 = d\kappa$ and $dc_2 = -d\kappa$, hence

$$\tfrac{d}{d\kappa}\left(u'(c_1) - E\left[v'(c_2)\right]\right) = \left(u''(c_1) + E\left[v''(c_2)\right]\right) < 0. \tag{7}$$

By (6), borrowing-constrained individuals benefit from stronger redistribution that reduces expected *net* income growth when expected *gross* income growth is positive. By (7), the positive welfare effects of redistribution are stronger when borrowing constraints are tighter.[3] Together, these two relationships imply that redistribution should *ceteris paribus* be more attractive for would-be borrowers in environments where borrowing is more difficult. To interpret this result in light of earlier work, it may be interesting to note that it reflects weaker POUM effects: when borrowing is difficult, the welfare effects of redistribution are strongly positive for poor individuals who cannot currently consume their higher future labor income.

[3] Differentiating the other terms of (5), the sign of their relationships to κ is that of $\left(u''(c_1) - E\left[v''(c_2)\right]\right)$ and of $\operatorname{cov}\left(v''(c_2), dw_2\right)$. These expressions may in general be positive or negative, and both vanish if $u'''(\cdot) = v'''(\cdot) = 0$. The sign of the third derivative of the period utility functions bears on interactions between liquidity constraints and redistribution: if it is positive then lower volatility of future resources weakens precautionary motives and makes borrowing more desirable.

3. Credit and empirical attitudes towards redistribution

Our derivations characterize the welfare effects of redistribution for individuals who are differently inclined to borrow, and face more or less stringent credit constraints. To test the empirical predictions on interactions between the willingness and ability to borrow and the welfare impact of redistribution, observable variation is needed along all three dimensions. As a determinant of borrowing's desirability, we will exploit income and age variation across individuals within each country. As an indicator of heterogeneous access to credit, we will rely on country-specific collateral requirements. And to assess the welfare impact of redistribution, we will use surveys of individual opinions (like Mayda and Rodrik, 2005, Alesina and La Ferrara, 2005, and Boeri and Brücker, 2005).

3.1 Data

Indicators of country-specific household credit supply conditions are available in the form of loan-to-value (LTV) ratios, i.e. the maximum possible fraction financed by housing mortgages. We view this as the best available proxy for institutional credit supply differences across developed countries. While the simple analytical derivations that illustrate our point above do not feature collateralized loans explicitly, following Jappelli and Pagano (1994) it can be argued that the LTV ratio is a plausible proxy for more general credit supply conditions since it is strongly positively correlated with the volume of household debt: the same financial market imperfections that reduce supply of mortgages also hamper opportunities for households to smooth consumption in the face of labor income trends or fluctuations.

As to microeconomic heterogeneity, the International Social Survey Programme

(ISSP) collects demographic, economic, and opinion data in many countries. The surveys of 1985, 1990 and 1996 contain questions specifically focused on the role of government. We mainly focus on the respondents' degree of agreement with the statement

> *"It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes,"*

which captures individual attitudes towards government redistribution at a level of generality comparable to that of our theoretical derivations. While the 1985 and 1990 ISSP surveys were administered to very few of the countries for which LTV information is available, Jappelli and Pagano (1994, Table 1 column 3) report LTV data in 1981-87 for 13 of the countries where the ISSP role-of-government supplement was administered in 1996 (Australia, Canada, France, Germany, Great Britain, Ireland, Italy, Japan, New Zealand, Norway, Spain, Sweden and the United States). Jappelli and Pagano (1994, Table 1, column 2) also report data on LTV in 1971-80, which are available for two additional countries in the ISSP: Israel and the Philippines. Dropping Israel and Spain, for which key microeconomic variables are missing in the ISSP, yields a data set of 9,800 individual observations from 13 countries. Table 1 reports definitions and summary statistics for the variables and sample we use in regressions below. Australia, Germany, and the US each provide over 10% of the 9,800 sample observations. Other countries' shares of the observations range down to 3% for New Zealand. Because of the heterogeneous sample size across countries, we weigh the variables in all regressions by the inverse of the number of observations available for the relevant country.

We code the survey's qualitative indication of individual i's views about government redistribution in increasing order from 1 to 5, so that higher values of the variable indicate that a respondent is more strongly in favor of redistribution. As a first approach to the data, in Figure 1 we plot the average survey responses at the country level and the LTV indicator. The two empirical indicators of course both depend on many other country-specific features, so it is not surprising to see that they are not related in the way our theoretical perspective would suggest. Our regressions on micro data below control for country effects, and identify the theoretical effects of interest exploiting interactions between individual and country-level information.

The survey data are cross-sectional, and contain no direct information on individuals' expected income profiles or access to credit.[4] We do observe the age and income, on an individual and/or household basis, of survey respondents. Age is a useful source of relevant heterogeneity, in that the longer horizon and steeper expected income growth of younger agents makes them more likely to be interested in borrowing, and to be constrained when credit is scarce.[5] Current income levels are also relevant to borrowing motives, in that expectations of income growth may result from mean reverting negative income shocks. Observed current income can be used as an indication of such temporary

[4] If a time-series panel component were available, it would allow researchers to disentangle permanent inequality from temporary shocks around expected growth paths (Alesina and La Ferrara, 2005). Repeated observations on the same individual would also make it possible to control perfectly for time-invariant unobservable individual heterogeneity and, in combination with time-varying information on financial market imperfections, could provide quasi-experimental evidence on the phenomena under study.

[5] See Crook (2006) for a summary of available cross-country evidence on the relationship between age and debt incidence and levels (Tables 3.2 and 3.3) and borrowing constraints (Table 3.6). Direct survey evidence is available for only 7 countries as regards indebtedness, and only for the US and Italy as to the incidence of the denied-credit event; both are more prevalent at relatively young ages.

fluctuations if other observable covariates are adequate proxies for permanent income differences. For this purpose, we include education, self-assessed socioeconomic class membership, and demographic and occupational information.[6]

Unfortunately, the definition of income in the ISSP survey is not comparable across countries: capital income may or may not be included, and measurement may be on a gross or net basis. Our preferred explanatory variable is therefore the respondent's within-country quartile position, which is likely to be invariant to the relevant measurement issues as long as redistribution schemes do not affect the ranking of individual incomes, so that the redistributive policy does not move individuals across quantiles.[7] Since some of the raw income-level variation eliminated by classifying income observations into quartiles may contain relevant information, in Section 3.3 we also test the robustness of our results to direct inclusion of income levels in the regression.

In combination with LTV information, these data make it possible to assess the relevance of credit constraints to attitudes towards redistribution. If age and/or temporary income fluctuations are the reason why some individuals are relatively poor, redistribution that affects cross-sectional relative incomes also has implications for the slope of individual incomes over time, and it is interesting to analyze empirically how borrowing constraints

[6] See the footnotes in Tables 2 and 3 for a complete list. The results we report control for unemployment, which in the presence of wage floors may approximate permanently low productivity rather than temporary shocks, already captured by income. Omitting the unemployment variable from the control set has virtually no impact on the results of interest.

[7] Under the same condition, quantile statistics are also cleansed of any (net) income endogeneity resulting from correlation between the preferences expressed in the ISSP data and the effects of each country's policy configuration that are not absorbed by fixed effects.

and such indicators of individual inclination to borrow interact in determining the welfare effect of redistribution.[8]

3.2 Regression results

To assess the empirical fit of the prediction that redistribution should ceteris paribus be more appreciated by constrained borrowers, we rely on the plausible assumption that within each of the available country samples, borrowing is more likely to be constrained for individuals who are young enough to consider borrowing, and for individuals whose low income - conditioning on age and on characteristics that may approximate permanent income - is associated with expectations of increasing income. Across countries, of course, borrowing is more likely to be constrained when credit is more tightly restricted.

Accordingly, we proceed to regress indicators of individual attitudes towards redistribution on individual and country characteristics that capture the ability and willingness to borrow: the loan-to-value ratio, income, age and their interactions. Table 2 reports coefficients and significance levels (computed on the basis of standard errors robust to country-level covariance clustering) for these variables in regressions that also include other available variables (see the notes to the Table) meant to control for less directly relevant dimensions of heterogeneity across surveyed individuals.

Columns 1 and 2 report estimates of the coefficients β from the multivariate ordered-probit specification

[8] In the cross-sectional data we use, average income is indeed increasing with age. Interestingly, if unsurprisingly given the presence of strong cohort effects, the opposite is the case in the transition countries covered by the ISSP survey but excluded from our sample for lack of household credit information.

$$\text{prob}(y_i = j) = \text{prob}(k_{j-1} < X_i\beta + u_i \leq k_j)$$

where $y_i \in \{1, 2, 3, 4, 5\}$ is the survey's qualitative indication of individual i's preferences; k_j, for $j = 1,...,5$, are the boundaries of the region where the latent variable $X_i\beta + u_i$ triggers outcome j; u_i is normally distributed across individuals (ordered logit estimates, not reported, yield very similar results); and the mean $X_i\beta$ of the latent variable depends linearly on the elements of X, a matrix of covariates. In column 1, the specification includes the loan-to-value ratio, which is constant within each country-specific subsample. The specification reported in column 2 replaces that variable with country fixed effects, and also includes the interaction of country fixed effects with all covariates other than age, income quartiles, and their interactions, which are still multiplied by the LTV indicator. In column 3 we report marginal effects from a binary probit model, collapsing values 1-3 of the dependent variable to 0 and values 4-5 to 1; the resulting binary variable has mean 0.55, and the absence of intermediate categories makes it possible to compute a more readily interpretable marginal-effect representation of the results. Finally, in column 4 we report the coefficients of a simple linear regression in the form $y_i = X_i\gamma + v_i$, which arbitrarily attributes a cardinal (quantitative) interpretation to the survey answers.

When analyzing the determinants of attitudes towards redistribution, our theoretical perspective leads us to focus on whether individual characteristics like age or income are more or less important in countries with different credit conditions. The effects of interest are those captured by the bold-face interaction terms in Table 2. The pattern of coefficients is qualitatively similar across the four specifications. The coefficients of the loan-to-value ratio and its interactions with age and income in column 1 are jointly significant at the 1% level ($\chi^2(8) = 56.07$). In column 2, the sign of the coefficients is robust to controlling for unobserved country effects and their interactions with the other covariates, while their significance is somewhat reduced. When we aggregate the replies in two categories (column 3) the signs of the reported marginal effects are the same as the coefficients in the ordered-probit specification. This allows us to conclude, for example, that a larger LTV is significantly associated with a smaller impact of current income on preferences for redistribution. The simple parametric specification reported in column 4 interestingly delivers the same pattern of signs as the other specifications, all of which deliver a similar message: individuals with lower income are not surprisingly in favor of more redistribution within each country, and relatively more so if they are younger, but these effects are interestingly weaker in countries with a higher loan-to-value ratio.

Because of the large number of interactions, it is not easy to interpret the size of each of the coefficients reported in Table 2. The message of the data and the quantitative and economic significance of the results, however, can be appreciated graphically. In Figure 2, we plot the probability of liking government redistribution predicted by the bivariate probit specification of Table 2 (column 3) for individuals aged 20 and 40, belonging to different income quartiles within each country, and living in countries with different LTV ratios. The relevant predicted probabilities are computed using the coefficients estimated on the complete sample of 13 countries, evaluating all interactions for a high and a low LTV observation realization: the United States's ratio is 89%, and Italy's is 56%. Confidence bands of +/- 1 standard error are displayed around the point estimates.

Recall that in the specification considered there is no main effect of the LTV variable, which is absorbed by country dummies along with the many other reasons why different countries' citizens may be differently inclined to favor income redistribution. In the Figure, therefore, the points labeled 'Italian LTV' differ from those labeled 'US LTV' because age and income quartiles are interacted with LTV. The predicted probabilities also depend on the additional covariates included in the argument of the probit's normal distribution function, all of which are set to their sample mean when plotting the Figure. To assess the findings' robustness to functional form, in Figure 3 we plot predictions from the regression of Table 2, column 4. That model's linearity makes it possible to represent the effect of different LTV observations on the interacted covariates, independently of the value of non-interacted covariates.

The two specifications convey broadly similar pictures of the relationship between income, age, borrowing restrictions, and the inclination to favor government redistribution. The latter depends on income in sensible ways: poorer households not surprisingly are more in favor of redistribution than richer ones. For each income quartile, and for all age groups, the inclination to favor redistribution is higher when all coefficients that our specification allows to depend on LTV are evaluated at the Italian rather than US level of LTV. This is consistent with our model's theoretical perspective, and the effects are quantitatively non-negligible. For example, the point-estimate predictions reported in Figure 2 imply that moving the LTV from the US to the Italian level would change a middle-income American's attitude towards redistribution more than a move, within the

US, from the third to the first income quartile. The confidence bands, also shown in the Figures, imply on the basis of the probit specification that the consumers' views of government redistribution at age 20 are significantly (at the 5% level) affected by the difference between the Italian and US LTV ratio, both in the first and second income quartile.[9] Interestingly, the relationship between agreement with government redistribution and current income is flatter when LTV is higher. To the extent that observable characteristics capture permanent income, this is implied by our theoretical results, since the negative welfare implications of currently low incomes that are expected to increase can be reduced by the consumption smoothing afforded by access to borrowing opportunities. The empirical relationship between age and inclinations to favor redistribution also turns out to depend on each country's LTV in theoretically sensible ways. Again referring to Figure 2, in the US age is less relevant than in Italy for individual attitudes towards redistribution. Empirically, the main effect of age is mildly positive, and the interaction effect of age and LTV is negative. The LTV observed for the US happens to be such that the two effects almost cancel each other out. Hence, the degree of agreement with government's redistribution role is (approximately) independent of age in the US.

In summary, the estimates support the theoretical notion that low-income households favor redistribution more in countries with less developed credit markets, and especially so when their young age makes them likely borrowers. The evidence is consistent with the implications of the theoretical framework discussed in Section 2. Empirically, age is almost

[9] The predictions are particularly precise for the second quartile, as all the estimated main effects and interactions of interest for the second quartile dummy are precisely estimated (see the Tables). This suggests that, in terms of the residuals resulting from controlling for other observable heterogeneity, individuals in that quartile are relatively more homogenous than others.

irrelevant when the credit market is as efficient as it is in the US. Theoretically, upward-sloping income expectations should indeed not be relevant to the slope of young people's consumption path when it is possible for them to borrow so as to satisfy the Euler equation: in a well-developed financial market, permanent income should be much more relevant than the slope of expected income paths in determining individual attitudes towards redistribution.

3.3 Robustness

We proceed to probe the robustness of the ordered probit specification reported in Table 2. In Table 3 we report various specifications, controlling (except in column 2) for country fixed effects and their interactions with the covariates.

In column 1 we add a control for household size. This reduces the number of observations substantially, because that information is not available for some countries, but the results of interest are not affected. In column 2 we drop the country dummies, which in the specifications discussed so far have subsumed all country-specific variation, and their interaction with the covariates. We can then include country-specific variables, namely the LTV (not significant) and country-specific indicators of average income and inequality. The PPP-adjusted per-capita income is drawn from the Penn World Tables for 1995 or 1996 (depending on each country's ISSP sampling year); p5p1 is the ratio of the median to the first decile of the overall wage distribution (OECD, 1996, Table 3.1). The estimated coefficients of per-capita income and p5p1 are negative, and significant for the latter (using the p9p1 ratio of the 10^{th} to the 1^{st} decile gives very similar results). Taken at face value this indicates that citizens of more unequal societies are less in favor of redistribution, but of course this correlation could be driven by omitted country characteristics. The interaction coefficients of interest are broadly similar. In regressions not reported we find that the results for the interactions of the loan-to-value ratio are robust to the inclusion of country dummies as well as interactions of household income and age with country-specific income means and inequality indicators.

In columns 3 and 4 we include as a regressor PPP-adjusted individual or household income levels (in linear and quadratic form) instead of income-quartile dummies. As mentioned above, income is measured differently across countries, but it is comforting to find that any resulting bias leaves the results of interest broadly unchanged. The inclination to agree with government's redistribution role declines (at a decreasing rate) in income; the effect is stronger for young individuals; and both the age and income effects are weaker if the loan-to-value ratio is higher. The main age effect now has a negative sign, but the marginal effect of age is still positive at the sample mean of the (differently defined) income and LTV interactions. Column 3 reports the results for individual income. The sample is unavoidably different, because individual income is not available for Italian observations; to make the results as comparable as possible across specifications, we do not include observations where household income is missing. The results are broadly similar, if somewhat less significant, to those obtained in the household-income specification of column 4.

We have experimented with other regression specifications. Replacing the dependent variable with ISSP responses on more specific aspects of redistribution (such as the role of the Government in "redistribution between rich and poor" or "providing a decent standard of living for the unemployed" or "helping university students from low-income families") yields results that are qualitatively similar to those we report, if sometimes less significant. We also experimented with alternative individual-specific covariates, such as education, which is likely to be correlated with the steepness of income profiles and may bear on individuals' inclination to borrow. Unlike age, however, education may be endogenous to within-country variation in the tightness of liquidity constraints, and we found no clear pattern in the coefficients of the level of education and its interaction with LTV.

Finally, we explored the robustness of the LTV variable as a country-level explanatory factor. Our preferred specification 2 in Table 2 imposes proportionality (to LTV) restrictions on cross-country heterogeneity in the coefficients of age and income. When the coefficients of interest are allowed to vary independently of LTV, they are statistically different (the restrictions can be rejected at the .5% level, $\chi^2(77) = 113.08$). While no obvious pattern of change can be detected in the estimates, it is of course impossible to exclude that the results are driven by the many other features that covary with LTV across countries. For example, the La Porta et al. (1998, Table 5, column 1) indicator of judicial efficiency and the OECD (1999, Table 2.2) indicators of overall strictness of protection against dismissals are both (weakly) correlated with LTV. It is possible that judicial efficiency may exogenously imply a tendency to protect workers (Botero et al., 2004) as well as poor credit availability. As a determinant of support for government redistribution, however, the LTV performs better: if it is replaced by the judicial efficiency indicator in the specifications reported in Table 2, the interaction terms are less statistically significant and far less stable, and none of the interaction coefficients is significant if an indicator for employment protection indicators replaces the LTV. The results suggest that the cross-country slope heterogeneity captured by the LTV interactions is not only a theoretically plausible, but also especially significant explanatory variable for attitudes towards redistribution.

4. Concluding remarks

Our theoretical analysis establishes that redistribution is likely to be more desirable when credit supply constraints are more binding. Empirically, survey data evidence suggests that the mechanism we emphasize in our simple model is relevant to individual policy preferences, and might play a role for aggregate policy choices. To the extent that welfare interactions between labor and financial market features can be mapped into policy choices, the results may contribute to explain why, as noted in the introduction, government interference with income distribution appears to be more pervasive in the same countries where household financial market access is more difficult.

Formal modeling of the link between individual preferences and actually implemented policies clearly lies beyond the scope of the present paper and available data, and would require attention to general equilibrium issues and specific assumptions about the timing and structure of policy choices. Our focus on redistribution and credit constraints, however, is meant to offer useful insights in the context of more general issues. Our theoretical derivations emphasize consumption smoothing, over time as well as across states of the world. Of course, financial market incompleteness, government policies, and country-specific socio-economic institutions interact with each other and with the structure of production as well as of consumption. Besides allowing a more precise characterization and empirical assessment of a specific channel through which such interactions work out, our specific focus on credit offers insights into the timing and complementarity of certain policy reforms. Since income insecurity makes it all the more painful for workers to lack access to consumption smoothing instruments, labor market deregulation need not improve the economy's ability to deliver welfare to its citizens unless accompanied by reforms aimed at easing borrowing constraints. Accordingly, it is not surprising to witness heavy resistance to labor market liberalization in countries in which credit supply remains relatively constrained, such as Italy, while the United Kingdom's financial market development may well have allowed that country to drastically reform its labor market in the 1980s (Koeniger, 2004).

Appendix

The second equality in equation (5) can be derived as follows. Adding and subtracting $E\left[v'(c_2)\right]dw_1$ and rearranging,

$$dU = \left(u'(c_1) + E\left[v'(c_2)\right]\right)dw_1 + E\left[v'(c_2)\left(dw_2 - dw_1\right)\right] ,$$

and adding and subtracting $\left(u'(c_1) + E\left[v'(c_2)\right]\right)Edw_2$

$$dU = \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 + Edw_2\right) + \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 + Edw_2\right)$$
$$-\left(u'(c_1) + E\left[v'(c_2)\right]\right)Edw_2 + E\left[v'(c_2)\left(dw_2 - dw_1\right)\right].$$

Noting that

$$\tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 + Edw_2\right) - \left(u'(c_1) + E\left[v'(c_2)\right]\right)Edw_2 = \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 - Edw_2\right)$$

we have

$$dU = \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 + Edw_2\right) + \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 - Edw_2\right) + E\left[v'(c_2)\left(dw_2 - dw_1\right)\right].$$

Since

$$\begin{aligned}
&E\left[v'(c_2)\left(dw_2 - dw_1\right)\right] \\
&= -E\left[v'(c_2)\right]dw_1 + E\left[v'(c_2)dw_2\right] \\
&= -E\left[v'(c_2)\right]\left(dw_1 - E\left[dw_2\right]\right) + \operatorname{cov}\left(v'(c_2), dw_2\right),
\end{aligned}$$

we finally obtain

$$dU = \tfrac{1}{2}\left(u'(c_1) + E\left[v'(c_2)\right]\right)\left(dw_1 + Edw_2\right) + \operatorname{cov}\left(v'(c_2), dw_2\right) + \tfrac{1}{2}\left(u'(c_1) - E\left[v'(c_2)\right]\right)\left(dw_1 - Edw_2\right).$$

References

Acemoglu, Daron and Robert Shimer, 1999. Efficient Unemployment Insurance. *Journal of Political Economy* 107, 893-928.

Agell, Jonas, 2002. On the Determinants of Labour Market Institutions: Rent Seeking vs. Social Insurance. *German Economic Review* 3, 107-35.

Alesina, Alberto, and Eliana La Ferrara, 2005. Preferences for Redistribution in the Land of Opportunities. *Journal of Public Economics* 89, 897-931.

Bénabou, Roland and Efe A. Ok, 2001. Social Mobility and the Demand for Redistribution. *Quarterly Journal of Economics* 116, 447-87.

Bertola, Giuseppe, 2004. A Pure Theory of Job Security and Labor Income Risk. *Review of Economic Studies* 71, 43-61.

Boeri, Tito and Herbert Brücker , 2005. Why are Europeans so Tough on Migrants? *Economic Policy* 44, 629–703.

Botero, Juan, Simeon Djankov, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer, 2004. The Regulation of Labor. *Quarterly Journal of Economics* 119, 1339-1382.

Crook, Jonathan N., 2006. Household Debt Demand and Supply: A cross-country comparison. In G.Bertola, R.Disney, and C.Grant (eds.) *The Economics of Consumer Credit*, Cambridge Mass: MIT Press, 63-92.

Fogli, Alessandra, 2000. Endogenous Labor Market Rigidities and Family Ties. New York University, mimeo.

Grant, Charles and Winfried Koeniger, 2005. Redistributive Taxation and Bankruptcy in

US States. IZA Discussion Paper 1805.

Hansen, Gary D., and Ayse Imrohoroglu, 1992. The Role of Unemployment Insurance in an Economy with Liquidity Constraints and Moral Hazard. *Journal of Political Economy* 100, 118-142.

Jappelli, Tullio and Marco Pagano, 1994. Saving, Growth, and Liquidity Constraints. *Quarterly Journal of Economics* 109, 83-109.

Koeniger, Winfried, 2004. Labor Income Risk and Car Insurance in the UK. *Geneva Papers of Risk and Insurance Theory* 29, 55-74.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny, 1998. Law and Finance. *Journal of Political Economy* 106, 1113-55.

Mayda, Anna Maria and Dani Rodrik, 2005. Why are Some People (and Countries) more Protectionist than Others? *European Economic Review* 49, 1393-1430.

OECD, 1996. *Employment Outlook*, chapter 3, Paris.

OECD, 1999. *Employment Outlook*, chapter 2, Paris.

Varian, Hal R., 1980. Redistributive Taxation as Social Insurance. *Journal of Public Economics* 14, 49-68.

TABLE 1: Descriptive statistics and variable definitions

	Mean	Std.Dev.	Min	Max	Definition
Attitude towards redistribution	3.30	1.30	1	5	"It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes." Agree strongly=5, Agree=4, Neither agree nor disagree=3, Disagree=4, Disagree strongly=1.
loan-to-value ratio (LTV)	81.16	9.57	56	95	Mortgage loan as % of house value, country average
age	43.51	14.04	16	94	Age of respondent in years
household income quartile (IQ):					
first (lowest)	0.23	0.42	0	1	Within-country family income quartiles [*]
second	0.23	0.42	0	1	
third	0.29	0.45	0	1	
					Respondent's self-assessed social status:
middle class	0.56	0.50	0	1	lower middle class/middle class=1, zero otherwise
upper class	0.09	0.28	0	1	upper middle class/upper class=1, zero otherwise
sex	0.45	0.50	0	1	Respondent male= 0, female=1
married	0.67	0.47	0	1	married or living as married=1, zero otherwise
completed secondary school	0.55	0.50	0	1	Secondary school degree= 1, zero otherwise
completed university degree	0.15	0.36	0	1	University degree=1, zero otherwise
currently unemployed	0.02	0.15	0	1	Respondent unemployed=1, zero otherwise
married, spouse unemployed	0.05	0.22	0	1	Spouse unemployed=1, zero otherwise
retired	0.08	0.27	0	1	Respondent retired=1, zero otherwise
disabled	0.01	0.11	0	1	Respondent disabled=1, zero otherwise
self employed	0.17	0.37	0	1	Respondent self-employed=1, zero otherwise
Australia	0.14	0.34	0	1	
Canada	0.05	0.22	0	1	
France	0.06	0.24	0	1	
Germany	0.13	0.33	0	1	
Great Britain	0.08	0.27	0	1	
Ireland	0.08	0.27	0	1	
Italy	0.05	0.22	0	1	
Japan	0.05	0.22	0	1	
New Zealand	0.03	0.18	0	1	
Norway	0.07	0.26	0	1	
Philippines	0.06	0.23	0	1	
Sweden	0.09	0.29	0	1	
USA	0.11	0.31	0	1	

[*] Quartile dummies are computed within each country using all available income observations. Their means differ from .25 because the sample only includes observations where no variables of interest are missing.

Sources: ISSP 1996 merged with available country-specific loan-to-value ratios from Jappelli and Pagano (1994). Spain and Israel excluded from the resulting dataset because of missing covariates (Israel: household earnings, Spain: marital status, class membership).

TABLE 2: Regression results

Dependent Variable:	"It is the responsibility of government to redistribute..."							
	(5= agree strongly, ... 1= disagree strongly)				(1= agree, 0= disagree)		(5= agree strongly, ... 1= disagree strongly)	
	Ordered Probit				**Binary Probit**		**Linear**	
	(1)		(2)		(3)		(4)	
	Coefficient	*p-value* [1]	*Coefficient*	*p-value* [1]	*Coefficient* [3]	*p-value* [1]	*Coefficient*	*p-value* [1]
loan-to-value ratio (LTV)	0.003	0.71						
Interactions of LTV with								
age / 1000	-0.371	0.08	-0.300	0.24	-0.180	0.01	-0.362	0.26
household income quartile (IQ), first	-0.017	0.19	-0.017	0.18	-0.010	0.00	-0.018	0.22
second	-0.022	0.00	-0.018	0.00	-0.011	0.00	-0.018	0.00
third	-0.013	0.33	-0.012	0.39	-0.004	0.35	-0.012	0.46
first IQ * age/1000	0.717	0.02	0.572	0.08	0.298	0.00	0.629	0.09
second IQ * age/1000	0.716	0.00	0.527	0.00	0.305	0.00	0.566	0.00
third IQ * age/1000	0.519	0.04	0.438	0.16	0.153	0.05	0.475	0.19
Controls								
age / 1000	32.266	0.05	28.237	0.18	16.267	0.00	34.000	0.20
first IQ	2.085	0.05	2.043	0.05	0.719	0.00	2.247	0.08
second IQ	2.300	0.00	1.964	0.00	0.718	0.00	2.082	0.00
third IQ	1.364	0.20	1.303	0.28	0.384	0.28	1.358	0.34
first IQ * age/1000	-63.319	0.02	-52.085	0.06	-25.912	0.00	-57.688	0.07
second IQ * age/1000	-61.384	0.00	-45.881	0.00	-25.553	0.00	-49.891	0.00
third IQ * age/1000	-43.990	0.04	-37.470	0.15	-12.018	0.05	-41.049	0.18
Additional covariates [2]	Yes		Yes		Yes		Yes	
Country dummies, main effects and interactions with additional covariates [2]	No		Yes		Yes		Yes	
Observations	9,800		9,800		9,800		9,800	
Log-likelihood	-14,988		-14,565		-6,176			
R^2							0.15	

[1] Data are weighed by the inverse of the number of observations available for each country. p-values are computed on the basis of standard errors robust to country-level covariance clustering.

[2] Additional covariates: sex, married, married and spouse unemployed, currently unemployed, completed secondary school, completed university degree, retired, disabled, self employed, middle class, upper class.

[3] Marginal effects (for dummy variables, effects of discrete changes from 0 to 1).

Sources: See Table 1.

TABLE 3: Robustness-test regression results

Dependent Variable: **"It is the responsibility of government to redistribute..."**

Ordered Probit (5= agree strongly to 1= disagree strongly)

	(1)		(2)			(3)		(4)	
	Coefficient	*p-value* [1]	*Coefficient*	*p-value* [1]		*Coefficient*	*p-value* [1]	*Coefficient*	*p-value* [1]
loan-to-value ratio (LTV)	-		0.009	0.23					
per-capita income/1000 (PPP-adjusted)	-		-0.038	0.15					
p5/p1 (ratio of median over first decile of wage distribution)	-		-0.383	0.00					
Interactions of LTV with					*Interactions of LTV with*				
age / 1000	-0.318	0.15	-0.438	0.03	**age / 1000**	0.587	0.01	0.634	0.01
household income quartile (IQ), first	-0.018	0.06	-0.021	0.08	**income/1000 (inc)**	0.021	0.29	0.017	0.00
second	-0.020	0.00	-0.023	0.00	**inc squared (inc2)**	-0.005	0.16	-0.002	0.00
third	-0.017	0.14	-0.015	0.22					
first IQ * age/1000	0.584	0.03	0.734	0.01	**inc * age/1000**	-0.004	0.05	-0.002	0.02
second IQ * age/1000	0.576	0.00	0.703	0.00	**inc2 * age/1000**	0.001	0.03	0.000	0.12
third IQ * age/1000	0.532	0.03	0.529	0.03					
Controls					*Controls*				
age / 1000	32.490	0.07	38.696	0.02	age / 1000	-48.725	0.01	-53.830	0.01
first IQ	2.214	0.01	2.474	0.02	inc	-2.004	0.22	-1.633	0.00
second IQ	2.212	0.00	2.430	0.00	inc2	0.455	0.15	0.155	0.00
third IQ	1.762	0.06	1.577	0.11					
first IQ * age/1000	-53.539	0.02	-65.788	0.01	inc * age/1000	27.007	0.03	15.857	0.02
second IQ * age/1000	-50.914	0.00	-61.624	0.00	inc2 * age/1000	-5.313	0.03	-1.233	0.11
third IQ * age/1000	-46.999	0.02	-45.928	0.02					
Additional covariates [2]	Yes		Yes		*Additional covariates* [2]	Yes		Yes	
Country dummies, main effects and interactions with additional covariates [2]	Yes		No		*Country dummies, main effects and interactions with additional covariates* [2]	Yes		Yes	
Observations	7,883		9,226			8,481		9,800	
Log-likelihood	-11,658		-13,987			-12,595		-14,557	

[1] Data are weighed by the inverse of the number of observations available for each country. p-values are computed on the basis of standard errors robust to country-level covariance clustering. Income is measured at the individual level for the regressions reported in column (3), at the household level in all other columns. Column (3) only considers observations on individual income for which household income is also available.

[2] Additional covariates: sex, married, married and spouse unemployed, currently unemployed, completed secondary school, completed university degree, retired, disabled, self employed, middle class, upper class. Specification (1) also includes household size.

Sources: Micro data from ISSP 1996; merged with available country-specific loan-to-value ratios from Jappelli and Pagano (1994). Spain and Israel excluded because of missing covariates. The sample size differs depending on availability of the relevant variables.

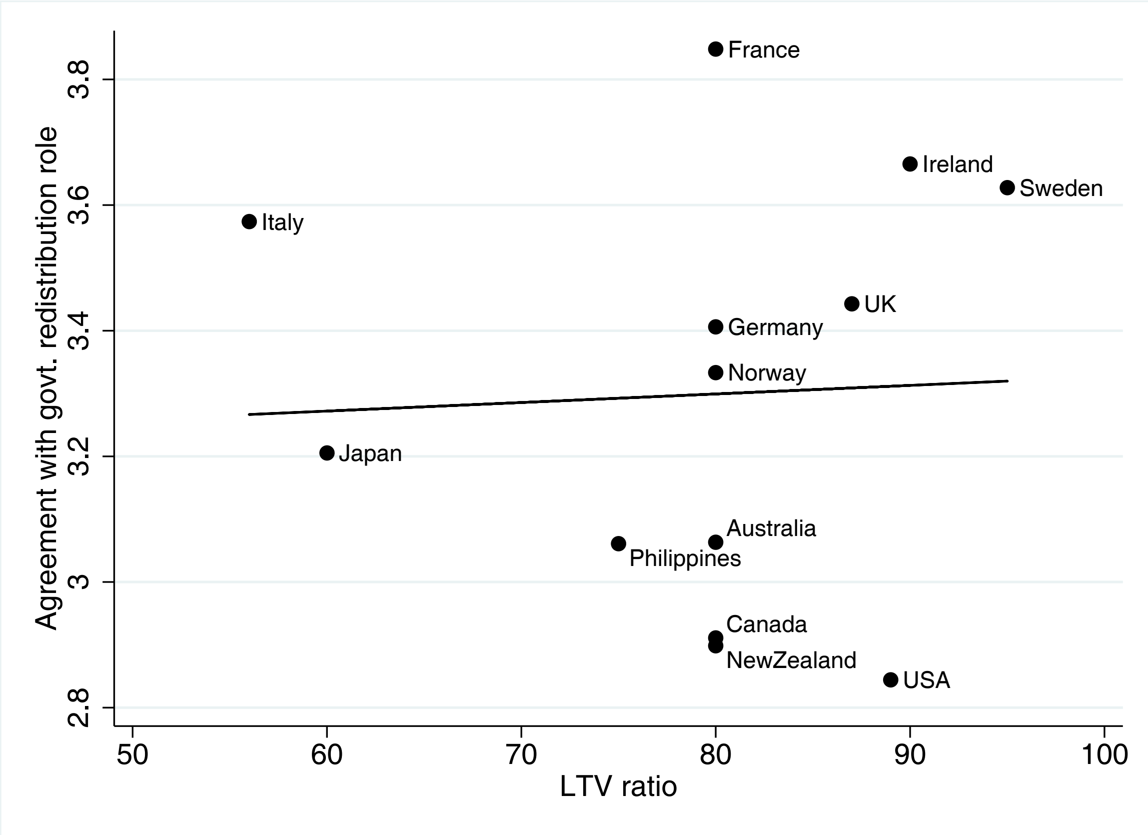

Figure 1. Average indicator of agreement with the government's redistribution role (from "Disagree strongly"=1 to "Agree strongly"=5) and loan-to-value (LTV) ratio. The solid line shows the predicted values from a regression of the former on a constant and the latter ratio.

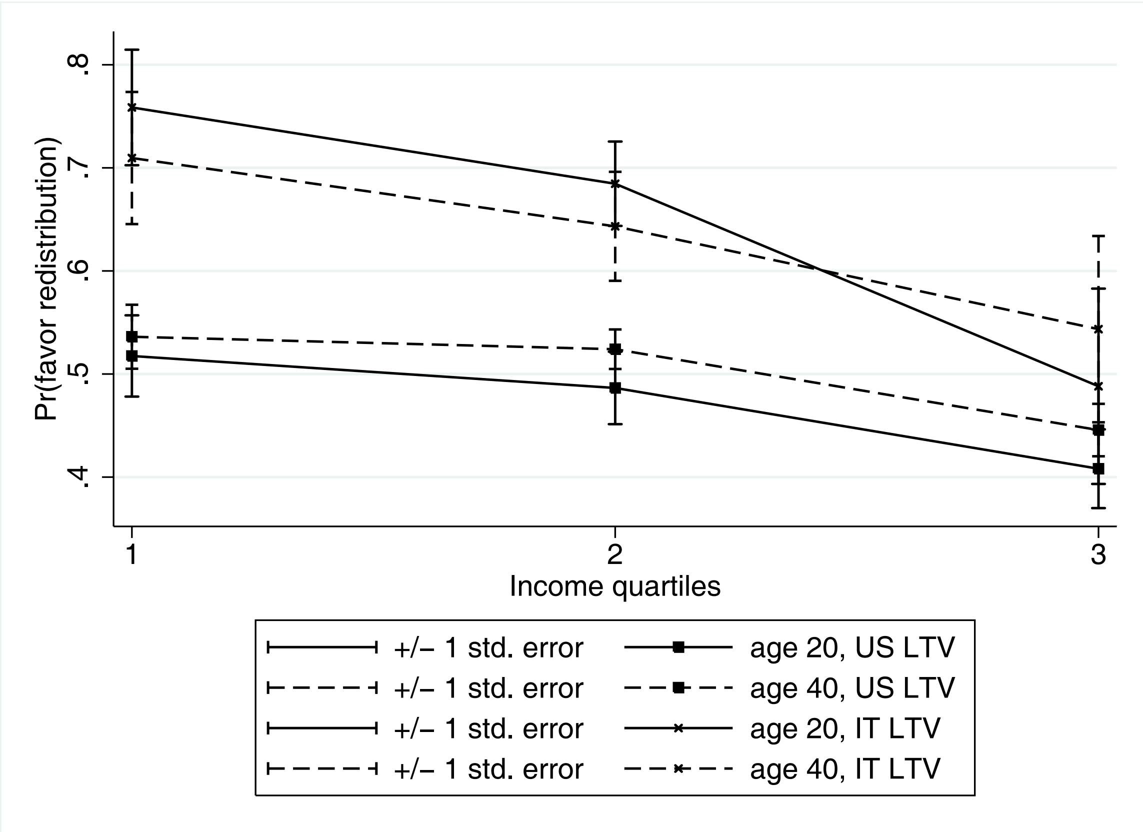

Figure 2. Probability of agreement with "it is a responsibility for the government to redistribute income…," predicted on the basis of the bivariate probit estimated in Table 2 (column 3) for individuals with different age, income quartile, and access to credit (measured by the LTV observed in Italy and in the US), as indicated. Country dummy set to zero, all individual variables set to their sample means. Confidence bands of +/- 1 standard error are displayed around each point estimate.

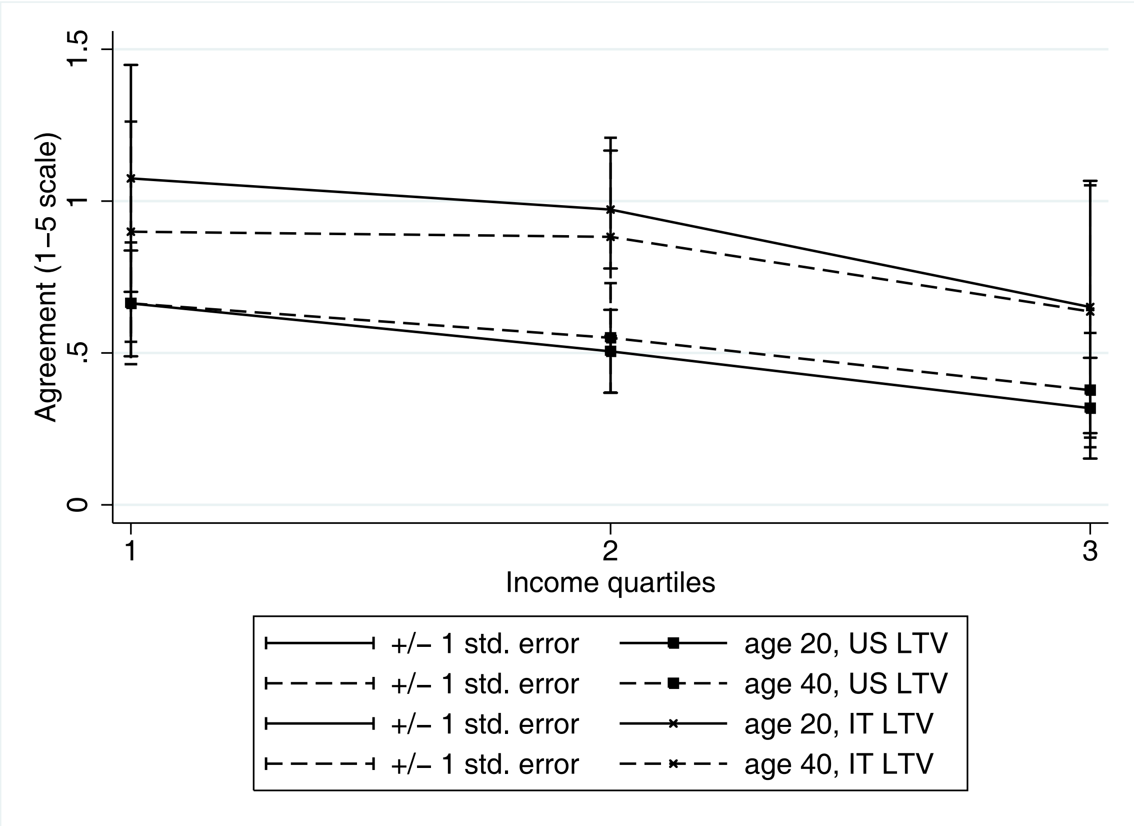

Figure 3. Quantitative indicator of agreement with the government's redistribution role (from "Disagree strongly"=1 to "Agree strongly"=5) predicted by the linear model estimated in Table 2 (column 4) for individuals with different age, income quartile, and access to credit (measured by the LTV observed in Italy and in the US), as indicated. All other variables are set to zero: this determines the origin the vertical axis but does not otherwise affect the effects of interest. Confidence bands of +/- 1 standard error are displayed around each point estimate.

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