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One size does not fit all: quantile regression estimates of cross-country risk of poverty and social exclusion in Europe

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One size does not fit all: quantile regression estimates of cross-country risk of poverty and social exclusion in Europe[1].

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Abstract

Using a macro panel of 31 European countries, this paper shows that the application of a QR procedure to the estimation of poverty risk offers a picture of poverty determinants and cross-country poverty differences more reliable than that emerging from conditional mean estimations. The extent and significance of interquartile differences of estimated coefficients suggest that economic growth, income distribution, public expenditure, and investment, as well as education and the labour share of social product—a proxy for *class struggle*—have strong but differentiated effects on poverty reduction. However, technical development does not have a similar effect. Low institutional quality exemplified by high public sector corruption has a significant concomitant adverse effect and interacts with economic cofactors in determining interquartile differences of estimated coefficients. Hence, definition and implementation of any European policy against poverty should consider cross-country interquartile differences and avoid a *one size fits all* uniform philosophy.

Keywords: Poverty, Income, Institutional Quality, Panel Quantile Regression, Europe
JEL Codes : C21, D63, D73, D78

1. Introduction

European authorities have endorsed the *Europe 2020* strategy since 2010 as a reaction to the outbreak and the protracted unravelling of the 2008 economic crisis. The strategy seeks to promote poverty reduction by aiming to lift at least 20 million people out of the risk of extreme poverty and social exclusion. Yet, the fulfillment of the goals of this policy seems under stress because the share of European citizens who are at risk of poverty, severe material deprivation, or live in households with very low work intensity has increased since the launch of the strategy. According to RSPC (2013, 27), in 2011 (the last year covered by the present paper) there were 4 million more people at risk of poverty and social exclusion in the EU with respect to 2008.
Causes and consequences of poverty and social exclusion have been debated in the literature. While I will discuss some of the existing theoretical contributions in other sections, I state here that this paper analyses how economic, political, and institutional factors affect the risk of poverty and social exclusion in European countries at the empirical level. As a specific contribution to the empirical literature, this paper in particular tests the hypothesis that the exposure to the risk of poverty and

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social exclusion is (co)determined by the institutional quality of the public sector and the labour share of national income, two factors not sufficiently considered by the existing literature. Specifically, I study whether poor institutional quality and a decreasing labour share of income may have both *autonomous* and *interactive* adverse effect on poverty and reduce the potentially positive impact of income growth on poverty. Results show that economic growth, income concentration, public expenditure/investment, education (but not technical development), and a democratic political tradition can reduce poverty but poor institutional quality (e.g., corruption) and a decreasing share of labour income significantly hinder those positive effects. For example, corruption alone increases the exposure to extreme poverty (according to my estimates, a one percent increase in corruption produces, on average, an increase in poverty risk four times as high) and reduces the favourable impact on poverty alleviation and social inclusion of the long-standing democratic/parliamentary organisation of political life. At the same time, a decreasing labour share of GDP significantly reduces the benefit of an increase in income. A second contribution of this paper is methodological. I test the hypothesis that the estimated coefficients of both economic and institutional variables—and their interactions—have significant *interquartile differences*, that is, the cofactors and interactions affect poverty changes according to the quantile distribution of poverty. This approach is motivated by econometric reasons that will be discussed below. Recall, however, that each explanatory cofactor potentially corresponds to a possible *policy variable*. Hence, in a panel framework, the existence of interquartile differences of estimated coefficients implies that policy tools may affect poverty according to the position of each country in the probability distribution of poverty. This information would be lost when conditional mean estimations are performed. On the contrary, considering these differences permits one to avoid the implementation of uniform cross-country anti-poverty programs and to activate specific country/quantile policy mixes in a way that reduces the risk of being trapped in a kind of *one size fits all* policy framework.

The rest of the paper proceeds as follows. Section 2 contains a brief survey of the literature on poverty and discusses the role of institutional factors as explanatory determinants of poverty risk and the lack of poverty convergence among countries. In sections 3 and 3.1, some properties of the distribution of the dependent variable are examined and the use of QR methods are discussed and justified. In section 4, I propose the hypotheses to be tested and in section 5, I present the various specifications of the QR empirical model. The subsections contain the empirical results, whereas detailed comments and policy implication are presented in section 6. A brief section 7 concludes. A graphical presentation of the data can be found in the Appendix.

2. Poverty, income, and the role of *institutions*

A satisfactory explanation of why some people are poor is essential if we are to be able to tackle the roots of poverty. Yet the weakest part of poverty analysis is precisely the understanding of its fundamental causes, and this makes it difficult to define a successful poverty alleviation 'strategy. In this section, I will emphasise two generally understudied factors that will play a significant role as determinants of poverty in the empirical analysis that follow.

Recent analyses of the causation process linking income, poverty, distribution and growth emphasise the role of drivers, such as education, factor endowments, sociopolitical mechanisms (Ross, 2001; see chap. 10 for a review) and ultimately *institutions*. In particular, the literature following the original approach of North (1990) treats political institutions as if they were humanly devised structures or as if they were simply 'the choice of a society', that is, the result of human decisions. Hence, institutions are seen to reflect citizens' preferences, choices, and thoughtful decisions and, as such, they play a *driving* role in explaining differences in income and poverty across countries. Consequently, citizens themselves are ultimately responsible for the income, distribution, and poverty differences between countries[2]. Political mechanisms have their own specific importance, particularly in parliamentary regimes, where poverty and inequality generate political and electoral pressure for redistribution. They make the median voter worse off, relative to the national *well-being* average, and provide the middle class electorate with incentives to

[2] Alternative explanations based on differences in geographical and/or natural resources endowments (fixed factors) are not considered as equally important.

support redistribution policy measures. Then, political institutions (including voting systems and budget procedures) are driving factors of cross-country differences in income, equality, and poverty because they are under the direct responsibility of citizens who—with their voting decisions—may choose to support or boycott pro-poor and pro-growth institutional improvements and reforms.
The idea that institutions not only explain and determine economic and distributional performance, but also likely to matter more than other fundamental long-term determinants, such as culture, religion, natural resources, and geography, has been recently challenged on empirical grounds. Hussey et al. (2017) present empirical results showing that in the last two decades the portion of cross-country income inequality explainable by differences in political institutions has decreased relative to the portion that cannot be explained by political institutions. Ravallion (2012) presents results showing that credit market and investment failures, as well as the size of countries' middle classes, are significant cofactors of income/consumption growth differences across countries. Bosco and Poggi (2016) show that institution quality matters as a driver of persistent poverty in Europe but fail to explain poverty's true state dependence in countries with low social expenditure, poor education, and a small middle class.
Nonetheless, even if institutions are not the exclusive or key factor in curbing poverty and reducing social exclusion, they may still be an important cofactor that interacts with economic variables. This means that although institutional quality may have a limited autonomous effect on poverty, it is possible that it strengthens or hampers the effect of socioeconomic factors on poverty.
A second factor that will be considered in this paper is the labour income share. To some extent, it is the proportion of GDP going to the working class. The labour share of national income has been falling across much of the world since the 1980s. This decline implies that an ever larger share of the benefits of growth accrues to the owners of capital. Although poverty risk and social exclusion do not immediately coincide with an impoverished working class, the falling labour income share does imply that social mobility reduces and access to basic goods becomes more difficult for larger sections of the population. I will test both direct and interrelated effects of the labour share variable on poverty.

3. Poverty risk as a dependent variable

In this section, I discuss what the understanding and measurement of 'poverty' is in this empirical study. As rightly noted by Whelan et al. (2012), among others, research on poverty in *rich* countries relies primarily on household income to capture living standards and identify the poor. Poverty, however, is a multidimensional condition of a human being and reference to non-monetary measures of material deprivation improves the understanding and measurement of poverty,[3] particularly when a cross-country comparison is a key issue. Accordingly, I move beyond relative income and adopt the *Eurostat* Index of people at risk of poverty or social exclusion[4] as the dependent variable. The index captures the proportion of the population satisfying *at least one* of the following conditions:

a) Face a risk of *monetary* poverty that is, living below the poverty threshold (60% of the national median equivalised disposable income, after social cash transfers). The threshold varies over time and in a number of EU member states, it has fallen in recent years due to the economic crisis[5].
b) Experience severe material deprivation (they lack at least four out of nine material deprivation items identified in the 'economic strain' and 'durables' dimensions[6].

[3] The literature on this issue has attracted attention and is gaining in importance. For a review, see Bosco and Poggi (2016) and Whelan et al. (2012).
[4] Source : http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=t2020_50.
[5] See Bárcena-Martin et al. (2013, 3) for a test of the reliability of the items included in their poverty and deprivation variable (similar to *RPSE*) as suitable proxies for the underlying deprivation concept. The overall estimated Cronbach's α was 0.718 and it was considered a satisfactory level of reliability for most countries analyzed in their paper.
[6] Hence, they cannot afford to: pay rent or utility bills; keep their home adequately warm; face unexpected expenses; eat meat, fish, or a protein equivalent every second day; go on a week holiday away from home; and own a car, washing machine, color TV, or telephone).

c) Live in households with very low work intensity (calculated by dividing the sum of total months actually worked by the working age members of the households by the sum of the workable months in the household).

I call this index Risk of Poverty and Social Exclusion, *RPSE*. To illustrate the properties of this variable (*and for later uses*), I proceed as follows. Fig. 1 and Fig. 2 plot the theoretical (blue) and empirical (red) density, respectively, of the dependent variable and the quantile representation of the data. Fig. 2 shows an adapted version of Jan Pen's Parade of Dwarfs (Cowell, 1995), with the order of arrival reflecting the quantiles of the distribution. The poorest (i.e., the most exposed to risk) will lead the march and arrive first, while the last to arrive are those with a poverty risk measure, which is less than a third that of the first ones. The mean marcher will arrive much earlier than the median marcher, signaling that the majority of marchers are (*luckily*) left behind. However, those who arrive first will complete the *circuit* three times faster. Figs. 3 and 4 show differences between the concentration curves. Concentration curves may be used to evaluate whether distribution of *RPSE* Lorenz dominates the distribution of *Per Capita income* and other cofactors. Dominance exists if the difference is positive for all quartiles θ. Fig. 3 shows Lorenz dominance relation between *RPSE* and *Per-capita Income*, whereas Fig. 4 illustrates Lorenz dominance relation between *RPSE* and Gini Index. They tell different stories. As shown by Atkinson (1970), if one distribution Lorenz dominates the other distribution, then the first distribution can be seen as less unequal than the second distribution under weak conditions. Likewise, if distribution of *RPSE* generalised Lorenz dominates distribution of *Per Capita Income* then the distribution of *RPSE* can be seen as preferable over distribution of *Per Capita Income* in terms of welfare under weak conditions (e.g., see Lambert, 2001). *RPSE* is distributed quite asymmetrically across quantiles but it is distributed more uniformly than *Per capita Income*. The estimation of the 99.5% percentile by adjusting the *RPSE* distribution with a normal one will introduce a relative approximation error of about 16%, indicating the presence of a heavy upper tail with no lower extreme values in the empirical distribution. The story is different when we plot $L(p)$ differences between *Per Capita Income* and *Poverty* and those between *Per Capita Income* and Gini Index. Poverty data are more concentrated than income data for low-middle quantiles (max. approximately at 4-th conditional quantile) and less concentrated for high quantiles (negative differences). With respect to *GINI* the highest value of the difference is as expected near the median. All these differences are ignored by conditional mean estimations (see section 3.1).

3.1 Implications of inequality in distribution for poverty estimations

Previous studies consider *average* effect of income, institutional quality, and other cofactors on poverty. However, in a panel data framework the slope parameters may vary at various quantiles of the conditional distribution because of individual (countries) and quantile heterogeneity resulting from the inequality in distribution discussed above. Since QR allows studying dependencies between variables in different quantiles of the response function, it may be preferred to LS techniques not only because quantile results are more robust to outliers but also because QR can describe the *entire conditional distribution* of poverty and show how regressors affect poverty risk *inequality*, as well as the average values. One can also check for interactions, such as whether and how the relation between poverty risk and some cofactors has been changing over time or differs across quantiles. In order to proceed, I define *RPSE* as a sequence of random variables drawn from a distribution as follows.

Fig. 1 Density of *RPSE*

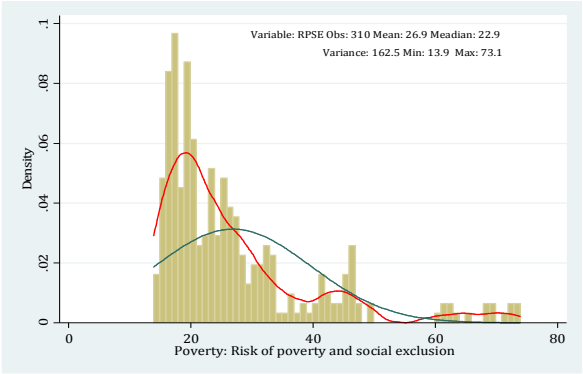


Fig. 2 Quantile Plot of *RPSE*

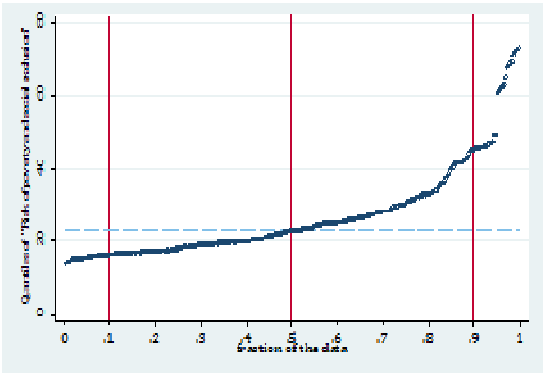


Fig. 3 $L_{RPES}(\theta)$ minus $L_{PER\ CAPITA\ INCOME}(\theta)$

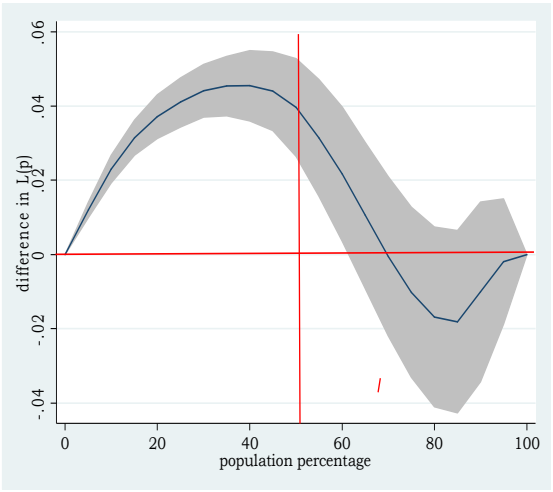
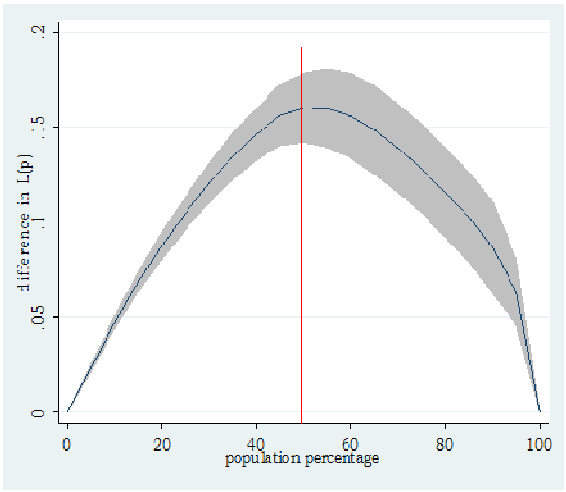


Fig. 4 $L_{RPSE}(\theta)$ *minus* $L_{GINI}(\theta)$



Let

$$P(RPSE_{it} < y_{it}) = F(y_{it} - \mathbf{X}_{it}\beta)$$

where F is unknown and $\mathbf{X}$ is a vector of regressors. As usual, the point of departure is the conditional quantile function

$$Q_{\theta}(\theta|\mathbf{X}_{it}) = F^{-1}(\theta|\mathbf{X}_{it})$$

where $\theta \in [0, 1]$ is the order of a quantile. Therefore the model to be estimated is

$$RPSE_{it} = \mathbf{X}_{it}\beta^{\theta} + u_{it}^{\theta} \qquad (1)$$

with

$$Quant_{\theta}(RPSE_{it}|\mathbf{X}_{it}) = \mathbf{X}_{it}\beta^{\theta} \text{ and } Quant_{\theta}(u_{it}^{\theta}|\mathbf{X}_{it}) = 0$$

where β^{θ} is the vector of parameters to be estimated, u^{θ} is a vector of residuals, and $Quant_{\theta}(RPSE_{it} | \mathbf{X}_{it})$ identifies the θth conditional quantile of *RPSE* given **X**.

Quantile regression (1) allows studying dependencies between variables in different quantiles of the response distribution and thus provides a more complete picture of the relationship between *RPSE* and **X**. Moreover, this statistical tool is robust against violations of the classical regression assumption about the distribution of the error term since the distribution of the random variables u_{it}^{θ} is left unspecified (robustness to outliers). The main point of the analysis is to test whether β^{θ} is independent of θ, in which case the entire model would collapse to $\mathrm{E}_F(RPSE_{it} | \mathbf{X}_{it}) = \mathbf{X}_{it}\beta$ since $m_F(RPSE) = E_F[RPSE | \mathbf{X} = X]$, where m_F and E_F are the median and mean, respectively, under distribution F and constant variance errors are assumed. In my panel data case, testing the robustness of QR estimates of poverty risk is equivalent to testing (and eventually rejecting) the results from a between panel data of poverty risk with the exception of the version based on median estimates.

A second advantage of QR regression can be illustrated as follows. Assume that *RPSE* is modeled by an OLS version of (1). Unobservable characteristics of countries may induce heterogeneity in the distribution of poverty, conditional on some regressor (call it X_1) through its effect on both the equation intercept and the estimated coefficient of X_1. Hence, the sequence of the random variable *RPSE* is not characterised by a single rate of change with respect to X_1. Assume that a linear location scale is introduced and constructed as an interaction term between X_1 and some other random variable X_2. The OLS equation is

$$RPSE_{it} = \alpha_i + \beta' \mathbf{X}_{it} + \gamma(X_1' X_2)_{it} + u_{it} \quad \text{with } u_{it} \text{ iid}$$

Hence, OLS consistently estimates

$$\partial E_F[RPSE_{it} | \mathbf{X}_{it}, X_1, X_2] / \partial X_1 = \beta + \gamma \bar{X}_2$$

This is the expected change of *RPSE* with respect to X_1 in a country with mean value of X_2, that is, the average 'treatment' effect of X_1 (e.g., Per capita income or Education) when we assume that an interaction exists with X_2 (e.g., an indicator of institutional quality or the Labour share of income). The drawback of this approach is that it implies an excessive restriction in the parameterisation of the model. In particular, estimated parameters either increase or decrease monotonically with X_2. On the contrary, QR provides a more flexible approach to modelling the effect of X_1 on different percentiles of the conditional distribution of *RPSE*. With exogenous X_1, a zero conditional quantile restriction on u_{it} implies that the effect of X_1 on the θ-*th* quantile of *RPSE* conditional on the observable regressors is

$$\frac{\partial Q_{\theta}[RPSE | \mathbf{X}, X_1]}{\partial X_1} = \beta^{\theta} + \frac{\partial Q_{\theta}[\gamma(X_1, e_{it}) | \mathbf{X}, X_1]}{\partial X_1}$$
$$= \beta^{\theta} + G_e^{-1}(\theta | \mathbf{X}, X_1)$$

where e_{it} is the error component of X_1 and $G_e(.)$ is some transformation of the distribution of X_1 in the entire population (Arias et al., 2001, 15). To show that the information provided by the last element of the above derivative would disappear with mean regression, we can proceed as follows. Continue to assume that *RPSE* is associated with the *Per capita income* variable, and let (*RPSE*, *Per capita income*) form a positive bivariate random vector with right continuous distribution $P(x, y)$, where from now on x = realisation of *Per-capita Income* and y = realisation of *RPSE*. Let *RPSE* have marginal distribution function $F(x)$. Assume *RPSE* is integrable and denote

$$m(RPSE) = E[RPSE | Per-capita\,Income = x]$$

the LS regression function of *RPSE* against *Per capita income*. As above, let, $Q_\theta(\theta) := \inf\{x : F(x) > \theta\}$ with $0 \le \theta \le 1$ be the right continuous quantile function associated with $F(x)$. If $\Theta = F(X)$ is the corresponding rank variable, the Rao and Zhao (1995) definition of quantile regression function of Y against X is

$$r(\theta) = E[Y|\Theta = \theta] = m \circ Q(\theta) \quad \text{with } 0 \le \theta \le 1$$

where ○ indicates function composition. Then, for fixed θ (for instance the median value), differentiation of $r(\theta)$ gives

$$\partial r(\bar{\theta}) / \partial X_1 = \partial E[Y|\Theta = \bar{\theta}] / \partial X_1 = \beta^{\bar{\theta}} + \begin{cases} \gamma \bar{X}_2 & \text{if an interaction component exists} \\ 0 & \text{otherwise} \end{cases}$$

As a result, the marginal effect of the covariate misses the component $G_e^{-1}(\theta|\mathbf{X}, X_1)$, that is, all the information provided by the (transformation of the) distribution of X_1 (*Per capita income*, in our example). This would be almost irrelevant were $P(x, y)$ the result of two identically distributed variables. However, when the distributions of x and y show different concentrations, the above loss of information may be serious.

To gauge the extent of the information loss in the case at hand, I proceed as follows. The cumulative QR function and its standardised form are

$$M(\theta) = \int_0^\theta m \circ Q(\tilde{\theta}) d\tilde{\theta} = \int_0^\theta r(\tilde{\theta}) d\tilde{\theta} \quad \text{and} \quad N(\theta) = \frac{\int_0^\theta r(\tilde{\theta}) d\tilde{\theta}}{\mu}, \text{ respectively,}$$

where $\mu = M(1) = E[Y]$. In our case, $N(.)$ is the fraction of *RPSE* attributable to the lowest θth fraction of *Per capita income* holders. Following Tse (2011), among others, $N(\theta)$ can be seen as the generalised version of the Lorenz curve in the presence of a covariate, which would reduce to the usual Lorenz curve when $Y = X$. In order to evaluate how reliable $m(RPSE) = E[RPSE \,|\, Income = x]$) is as an estimator of poverty, it is useful to compare the concentration of *RPSE* with that of *Per capita income*, as well as that of other potential cofactors. This is what has been done above. Comparisons allow appraising whether or not the distributions are similar across quantiles of the same order, and therefore, to evaluate how differences in the concentration of the data may affect the estimates obtained from $r(\theta) = E[Y|\Theta = \theta] = m \circ Q(\theta)$ at each θ. As one can see from Figs. 3 and 4, concentration plots show non-monotonic differences across quantiles. While in our case, this might be partially expected with reference to current *GINI* (differences monotonically increase before the median and then monotonically decrease), the non-monotonicity of Fig. 3 raises more concern. Further, it indicates that the conditional mean estimation of poverty obtained using cofactors having that kind of probability distribution and concentration, in relation to poverty, might obscure crucial information contained in the data generation process. Income, GINI, and other cofactors may still be reasonable regressors of poverty but conditional mean estimation is not the best testing procedure.

4. The regressors and the hypotheses under test

I use a panel data of 31 European countries (the 28 *current* members of the EU plus Norway, Turkey, and Switzerland) ranging from 2002 to 2011. I postulate that the *Risk of Poverty and Social Exclusion* (RPSE) depends upon economic, governance, and institutional factors. These are:

1) *GDP per capita*. I use the PPP Converted *GDP* Per Capita (Laspeyres) at 2005 constant prices. The data source is Penn Tables[7]. The hypothesis is that an increase in average income reduces the exposure to the risk of poverty or social exclusion. While *GDP* per capita is a proxy the effects on poverty risk of the 'average size of the pie', I complement this information with a proxy of the (initial) 'size of the slices', that is, a *GINI* index at the start of the period.

2) *Total Public Expenditure*. It is measured as a percentage of *GDP* in each country. It partially represents the 'weight' of the public sector in each economy. Poverty, however, can be greatly affected by the share of public expenditure destined for 'social purposes'. For this reason, I use *Social Public Expenditure* as a regressor under the hypothesis that the poor are supposed to benefit from that specific government activity. Data are taken from IMF Statistics and Eurostat. I also test the combined effect of public expenditure and the perceived *quality* of the government activity on *RPSE* (see below).

3) *Local expenditure as a percentage of total public expenditure.* It represents the extent to which expenditure powers are distributed between central and regional/local governments in each country[8]. Hence, the variable is an indicator of the degree of decentralisation of the public administrative machine but clearly not of the distribution of *tax/expenditure* powers between central and regional/local governments. Consequently, it should not be considered a rigorous measure of fiscal federalism in each country. The hypothesis is that when the share of local public expenditure increases, the exposure to the risk of poverty or social exclusion also increases because a highly decentralised administrative machine having autonomous expenditure powers introduces local differences in social policy, which may jeopardise the government's overall national anti-poverty policy. This would accord with the perception of Musgrave (1959, 182) that the 'distributional branch requires primary responsibility at the central level'.

4) *Annual labour income share*[9]. The annual labour income share used in the paper corresponds to the OECD index that is calculated by dividing the total labour costs by the nominal output. The term *labour income share* is used as the total labour costs measure relates to compensation of employees, after excluding the self-employed, and thus essentially relates to labour income. The division of total labour costs by nominal output is sometimes also referred to as a *real unit labour cost* as it is equivalent to a deflated unit labour cost where the deflator used is the *GDP* implicit price deflator for the economic activity (i.e., each sector) concerned. I use it as a proxy for measuring of the share of total social product going to workers as the outcome of labour-capital sociopolitical relation/confrontation. The labour share of national income has been falling across much of the world since the 1980s. According to the OECD, labour captured just 62% of all income in the 2000s, down from 66% in the early 1990s. This decline implies that productivity gains no longer translate into a broad rise in pay. Instead, an ever-larger share of the benefits of growth accrues to the owners of capital. This phenomenon should be related to the effects of trade (greater reliance on import by countries with low pay is associated with a bigger decline in labour's share), technology (cheaper and more powerful equipment make it attractive for firms to swap labour for software and machinery), and labour market regulation (in the late 1970s European workers enjoyed high labour income shares thanks to stiff labour-market regulations but when labour-market liberalisation swept across Europe in the early 1980s, labour shares tumbled). I will test both direct and interrelated effects of the labour share variable on poverty.

The following are the institutional or *governance* variables:

1) *Corruption in the public sector*. It is commonly defined as the misuse of a public office for a private gain and encompasses unilateral abuses by politicians and government officials, such as embezzlement and nepotism, bribery, extortion, influence peddling, and fraud. It is one of factors driving poverty differences across advanced countries. The effect of corruption is that huge

[7] Source : https://pwt.sas.upenn.edu/php_site/pwt71/pwt71_retrieve.php
[8] Source : http://epp.eurostat.ec.europa.eu/portal/page/portal/government_finance_statistics/data/database
[9] Source: http://stats.oecd.org/index.aspx?queryid=345

amounts of resources are diverted from potentially productive legal activities into rent-seeking ones. Thus, it interferes with efficient allocation decisions and can jeopardise redistribution policy (Laffont, 2006). For reasons I have discussed elsewhere (Bosco, 2016), I use the *Corruption Perception Index* (*CPI*) developed by Transparency International and first released in 1995. It ranks countries based on the perceived corruption of their public sector. *CPI* is a composite index, drawing on corruption-related data from experts and business surveys carried out by a variety of independent and reputed institutions. All sources measure the overall extent of corruption (frequency and/or size of bribes) in the public and political sectors, and all of them provide a ranking of countries. During the sample period (2002–2011) of our study, *CPI* ranges from 0 (highly corrupt) to 10 (very clean) and seems to better approximate the relevance of the phenomenon I want to incorporate in this study, that is, corruption in the public and political sector. I test the hypothesis that corruption directly increases the exposure to the risk of poverty and reduces the favourable impact of growth and a democratic organisation of political life. Robustness will be checked by replacing *CPI* with *Rule of Law*[10].

2) *Rule of Law*[11]. This reflects a set of perceptions among agents about confidence in the rules of society and abiding by them. In particular, the quality of contract enforcement, property rights, police and court activity, as well as the likelihood of crime and violence is considered. The units in which the control of corruption is measured for each year follow a normal distribution, with mean 0 and a standard deviation of 1. This implies that the scores range from approximately -2.5 (weak government performance) to 2.5 (strong performance).

3) *Uninterrupted Democracy*. I construct a [0, 1] dummy variable (D_1 and D_0) to incorporate in the analysis the evolution of the political regime in each country. D_1 corresponds to the condition of having been (without interruption) a parliamentary democracy since the end of World War II, and 0 corresponds to the opposite case of having experienced other forms of political regimes (ranging from fascism to peoples' democracies). Hence, the dummy simply permits us to evaluate whether the risk of poverty is higher/lower in countries that have maintained 'free' and democratic political institutions for a longer time. In other words, by using D_1 and $D_{0,}$ I test for the effects on poverty risk of a country habituated to a long-standing pluralistic (i.e., multi-party) parliamentary political regime.

I also control for the following variables.

The *Top Education Level* of each country. The variable I use is the *percentage of people aged between 30 and 34 years holding a tertiary-level degree*[12]. I have chosen this specific education level and this generational cohort due to the assumption that graduates of that age are the most dynamic, talented, and relatively more aggressive agents in the labour market. Hence, I test whether the more top educated young people a society has, the less likely that it would fall in a poverty condition. If this were the case, the high education variable would reduce poverty because it would produce favourable social externalities. If the opposite result emerges, young and highly educated people simply use top education to fuel their self-interested behaviour without engendering poverty reduction. Obviously, in countries where poverty is high, the bulk of this segment of the young population belongs to the rich privileged part of it and QR estimates should produce differentiated results according to the quantiles of the poverty variable.

An indicator of T*echnological progress*. High technological progress should make the industrial and service sectors more efficient and productive. However, in developed countries, technological change tends to increase the productivity of highly qualified workers more than that of less qualified ones. The demand for the former may rise at the expense of the latter. Hence, technical progress

[10] World Bank, Worldwide Governance Indicators (WGI) http://info.worldbank.org/governance/wgi/index.asp

[11] World Bank, Worldwide Governance Indicators (WGI) http://info.worldbank.org/governance/wgi/index.asp

[12] Source documents/edat_lfse_12(1)

might increase the exposure to the risk of poverty or social exclusion of the less qualified segments of the working population. To test this hypothesis, I use the number of *Patent Applications* per million inhabitants of each country as an indicator of the average level of the country's technological level (source: Eurostat). Another reason for using this variable as a proxy for technical change is that other factors generally employed for technological change, such as total factor productivity, are strongly correlated with the labour share of income since they account for most of the decline of the labour share in OECD countries. The use of patent applications reduces the risk of perfect multicollinearity.

The hypotheses to test are the following.

Economic vs. Institutional factors. I first test the hypothesis that economic development (measured by *GDP* per capita), initial equality of income distribution, high labour share of social product, and top education reduce poverty, whereas technological progress, corruption (or bad governance and low governmental effectiveness) increase it. Second, I test whether these factors affect poverty in a purely autonomous way (e.g., corruption and bad governance increase poverty at any level of per-capita *GDP, Education*, etc.) or they also produce significant interaction effects, either reinforcing or weakening the effect of other economic factors. Hence, the first hypothesis is about the relevance and combination of both economic and institutional factors.

The role of the public budget. Poverty may be expected to decrease with the overall *size* of the public sector, measured by total public expenditure as a share of *GDP*. Yet, even the reverse hypothesis can be postulated depending on the composition of public expenditure and tax revenues. On the contrary, poverty should be reduced by specific and targeted *Social Expenditure*. At the same time, it may be possibly increased by a 'federal physiognomy' of the public budget (the *Musgravean* effect of local finance; see above). Accordingly, I test if the exposure to poverty risk increases/decreases with *total*, *social*, or *local* public expenditure. This implies that the test is about the amount and composition of public expenditure (Total and Social), as well as the political responsibility of its management (Central and Local).

The political element. At first sight, one may expect poverty risk to be lower in European countries with longer *democratic traditions* because voters have greater experience and can be trusted to support parties with prominent and trustworthy distributional platforms. Yet, this political participation process interconnects with the institutional, economic, and distributional conditions of each country. Effective political participation (with its distributional consequences) may actually require the attainment of a minimum economic and social status. Lacking that status, participation may be *de-facto* precluded or quite limited for many voters. Hence, the interaction of income, institutional, and political factors might affect poverty adversely even in long-lasting democracies, with their tradition of multi-party competition for parliamentary seats. Hence, I test whether a positive/adverse effect exists and how it contributes to the explanation of cross-country poverty differences.

The common framework of the test strategy. The common framework of the above hypotheses is the existence of interquartile differences in the estimated coefficients. I postulate that the effect of cofactors changes with the quantiles of poverty and that the differences in quartile estimates *are statistically significant*. Statistically significant differences across quantiles would suggest a different sensitivity of poverty to the cofactors. As many cofactors are also policy instruments, interquartile/country differences would signal the need for graduating the intensity of the policy measures according to countries' position on the distribution of the poverty variable. This policy insight would not emerge from conditional mean estimates. As a result, QR estimates offer information that permits the design of policy tools (e.g., at the Commission level) in a way that avoids a mechanical cross-country uniformity and reduces the risk of implementing a European version of a *one-size-fits-all* poverty alleviation program. After all, *this* is the main hypothesis to test.

5. Specifications of the empirical model and results

5.1 QR estimations

I first estimate a QR panel data model with interactions (*i* indicates countries and *t* years) where $\alpha_i^{(\theta)}$ is a (time constant) individual effect that varies with the quantiles:

$$\begin{aligned} RPSE_{it} = {} & \alpha_i^{(\theta)} + \beta_1^{(\theta)}(Per-capita\,Income)_{it} + \beta_2^{(\theta)} GINI_{it} + \beta_3^{(\theta)} CPI_{it} \\ & + \beta_4^{(\theta)}(Total\,Public\,Expenditure)_{it} + \beta_5^{(\theta)}(Labor\,Share\,of\,Income)_{it} \\ & + \beta_6^{(\theta)}\left(Per-capita\,Income\right)_{it}^2 \\ & + \beta_7^{(\theta)}\left(Per-capita\,Income \times LaborShare\,of\,Income\right)_{it} \\ & + \beta_8^{(\theta)}\left(Per-capita\,Income \times CPI\right)_{it} \\ & + \beta_9^{(\theta)} Democracy + \beta_{10}^{(\theta)}\left(Top-Education\right)_{it} + \beta_{11}^{(\theta)}\left(Tec-Index\right)_{it} + u_{it}^{(\theta)} \end{aligned}$$

Results are reported below in Tab 1, whereas Tab 2 shows estimates of linear predictions of the elasticities of *RPSE* with respect to some factors as well as marginal changes (symbol: *dy/dx*). F-test results for equality of estimates *across quantiles* are reported in Tab. 3. The estimates clearly reject equality of estimated coefficients for all the quantiles in each case. These differences are evident in the plots reproduced below in Fig. 5. Each plot represents visually the behavior of some coefficients (LS conditional mean estimates = dashed horizontal lines).

<< Tab. 1 approximately here >>

<< Tab. 2 approximately here >>

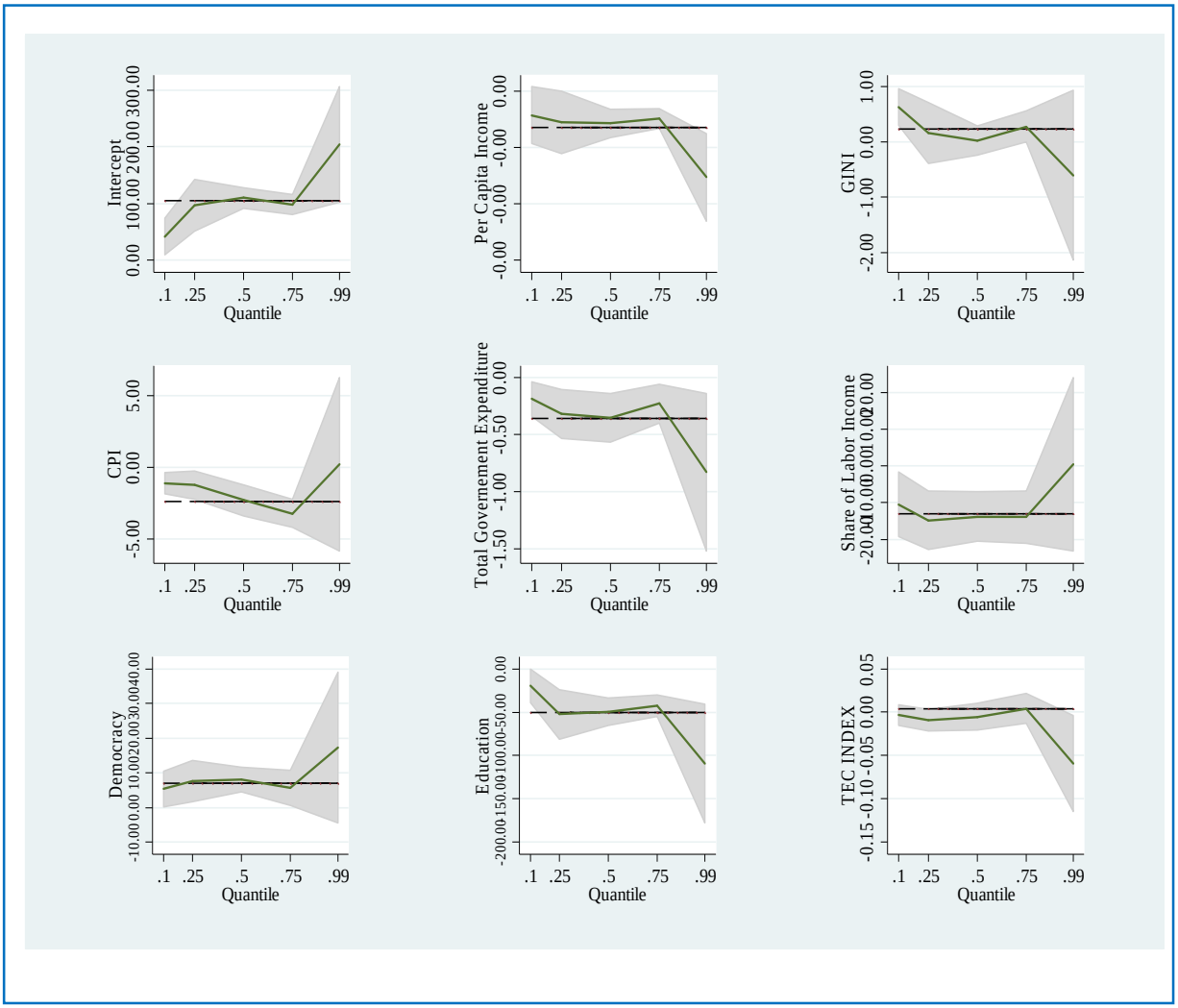
<< Tab. 3 approximately here >>

With a second non-linear panel data model, I check for robustness the main insights provided by model 1. I substitute *LAW* for *CPI* and *Social Expenditure* for *Total Expenditure*:

$$\begin{aligned} RPSE_{it} = {} & \alpha_i^{(\theta)} + \beta_1^{(\theta)}(Per-capita\,Income)_{it} + \beta_2^{(\theta)} GINI_{it} + \beta_3^{(\theta)} LAW_{it} \\ & + \beta_4^{(\theta)}(Social\,Expenditure)_{it} + \beta_5^{(\theta)}(Local\,Expenditure)_{it} \\ & + \beta_6^{(\theta)}(Labor\,Share\,of\,Income)_{it} + \beta_7^{(\theta)}\left(Per-capita\,Income\right)_{it}^2 \\ & + \beta_8^{(\theta)}\left(Per-capita\,Income \times LaborShare\,of\,Income\right)_{it} \\ & + \beta_9^{(\theta)}\left(Per-capita\,Income \times LAW\right)_{it} \\ & + \beta_{10}^{(\theta)} Democracy + \beta_{11}^{(\theta)}\left(Top-Education\right)_{it} + \beta_{12}^{(\theta)}\left(Tec-Index\right)_{it} + u_{it}^{(\theta)} \end{aligned}$$

Results are reported below in Tab 4, whereas Tab 5 shows estimates of linear predictions of the elasticities (symbol: *ey/ex*) of *RPSE*, with respect to each factor as well as marginal changes (symbol: *dy/dx*). F-test results for equality of estimates *across quantiles* are reported in Tab. 6. The estimates clearly reject equality of estimated coefficients for all the quantiles in each case. These differences are evident in the plots reproduced below.

Fig. 5 *Estimated coefficients of model 1*



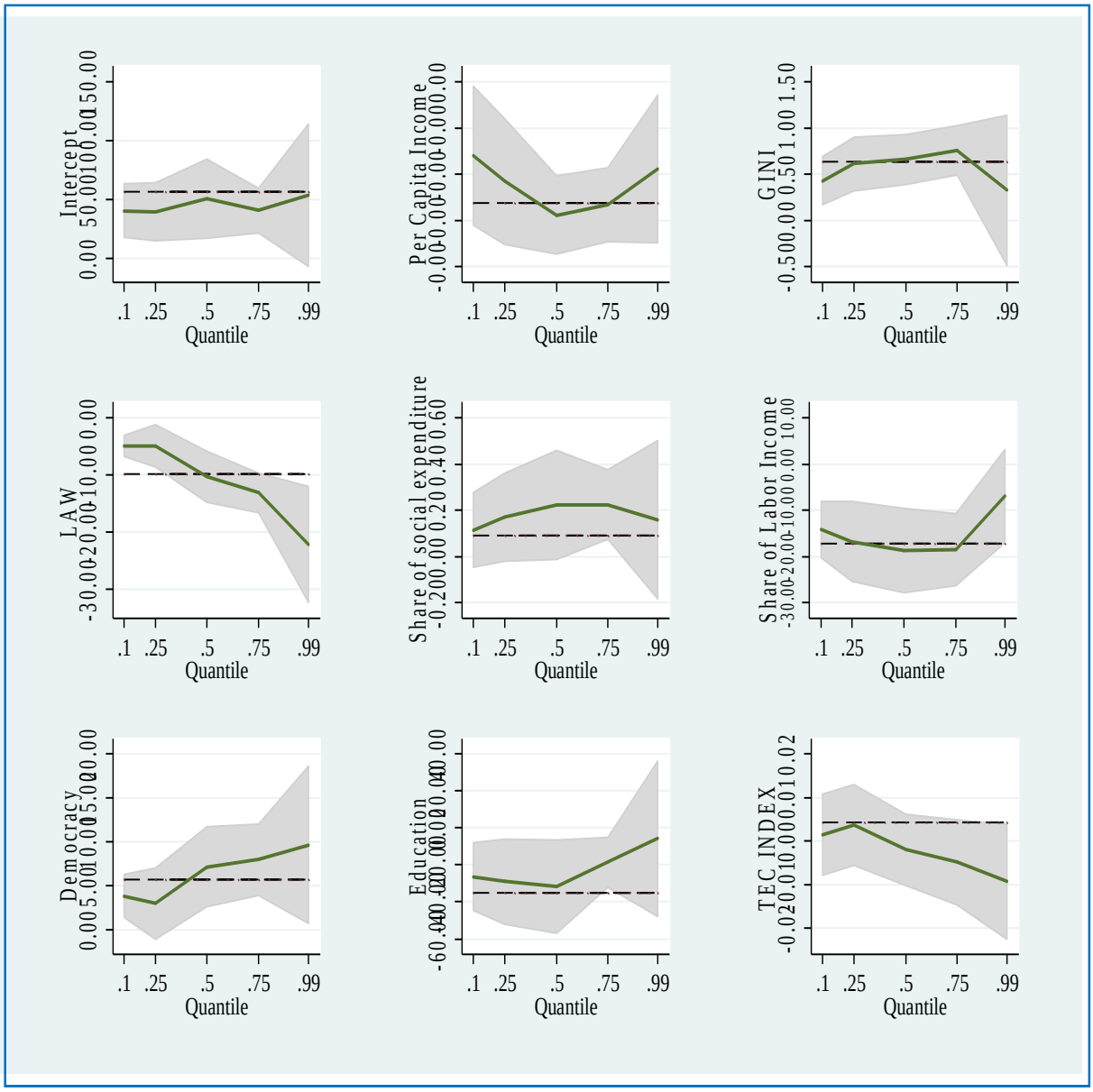
<< Tab. 4 approximately here >>

<< Tab. 5 approximately here >>

<< Tab. 6 approximately here >>

The following plots (Fig. 6) represent visually the behaviour of some coefficients of model 2 (LS conditional mean estimates = dashed horizontal lines).

Fig 6 *Estimated coefficients of model 2*



6 Comments and discussion

6.1 Poverty and Per capita income

The somewhat controversial relationship between per capita income and multidimensional poverty is at the heart of many recent studies. Kenworthy et al. (2011) conclude that in affluent countries there is no association between per capita *GDP* and poverty whereas other papers find contrary results. Dell'Anno et al. (2013), who propose an overall index of social exclusion for European countries and analyse its relationship with economic growth, find that Granger causality runs one way from social exclusion to the growth rate of *GDP* per capita and not, as many expect, the other way round. On the contrary, results presented by Whelan et al. (2012) and Bárcena-Martin et al. (2014), among others, show that country differences with respect to (frequency-based) material deprivation levels are explained by differences in the characteristics of individuals (micro-level

perspective), *as well as* by country-specific factors (macro-level perspective), including (total) *GDP*. As for the so-called BRICS (high growth) countries, an often-quoted example is the dramatic reduction of poverty headcount rate in China, which, according to official statistics, fell from more than 30% in 1978 to just over 3% in 2000.

My estimated coefficients are always negative and statistically significant (income has a vast and generalised negative impact on poverty) but quantile differences are considerable and statistically significant (see Tables 3 and 6). Countries with poverty falling in low quantiles benefit more from an increase in income. The same result emerges for the initial level of inequality. Estimated coefficients of initial Gini Index significantly affect current poverty. Hence, high initial inequality is positively associated with poverty, but contrary to other results found for developing countries (e.g., Kalwij et al., 2007), Gini elasticity at median values is higher than income elasticity. Income and initial distribution are significant factors in the explanation of poverty risk and poverty risk differences in Europe. Notice that income affects poverty in a nonlinear way but the quadratic component (even for median estimates, i.e., at Q_{50} in each Table) is negligible. Hence, one cannot maintain that in Europe poverty and income are bound by a sort of true U-type relation. An increase in mean income generates poverty reduction at any level of mean income and for any quantile of the poverty distribution but the existence of a weak nonlinear component implies that there is a lower bound (however low) of poverty that cannot be reduced by simply increasing average income beyond some definite value (approximately 65,000 US dollars of 2005). In other words, there seems to exist a sort of '*natural rate of poverty'* corresponding to a high level of per capita income, that cannot be eliminated, ceteris paribus, by further increases in per capita income. Once that income threshold is reached, a country must accept that economic development alone cannot reduce the poverty level. Yet, if we look at Tables 2 and 5, we see that the values of marginal variations of Labour Share and Democracy are high and significant. Then, if we repeat Model 1 analysis only for Q_{10} and Q_{25} (the lowest poverty probability values), the following results are obtained (model 2 gives similar results):

	dy/dx	*η*
Per-capita Income	–.00008*	–.078*
	(–2.18)	(–1.99)
Labour Share of Income	–12.01***	–.41**
	(–4.52)	(–2.99)
Dummy Democracy	9.23*	.30*
	(2.50)	(2.28)

Therefore, in rich long-standing parliamentary democracies, the 'would be' natural rate can be further reduced not by growth alone but by an increase of the *Labour Share*— a change in the functional distribution of national income affects poverty in rich countries when an increase in average income is ineffective.

We respect to other cofactors, it may be stressed that *Per capita income* interacts significantly with the labour share of income (see above) and with institutional quality (both *CPI* and *LAW*). In both specifications of the model, institutional quality reduces poverty (see below) but *CPI* seems to have a higher explicative power over *LAW*, especially when it interacts with income. Yet, the interaction between income and labour share of income yields stronger results and this produces the higher values of both marginal variations and elasticities reported in Tables 2 and 5.

6.2 Poverty and Public expenditure, Social expenditure, and Local expenditure

Results show that poverty is not significantly affected by total public expenditure. This may be attributed to a low contribution of total public expenditure (interest payments, military procurements, etc.) to the strengthening of human capabilities and reduction of transaction costs for better pro-poor market and non-market activities. However, estimates obtained using *Social Expenditure* instead of *Total Expenditure* (Table 4) show a favourable impact on poverty. Once again, the impact varies significantly across quantiles (see Table 3) and produces higher coefficients around the median value of poverty (Fig. 6), as if social expenditure affected mainly mean-median quantiles, with less impact on the lowest or highest ones. These findings may indicate that the *very* poor and the almost not poor at all benefit from social expenditures and programs only partially[13]. The explanations include a reduced efficiency and effectiveness of social expenditure (who does ultimately benefit from this activity and by how much?),a high complementarity between social expenditure and other sectors' expenditures, or simply (as is the case in my data set) an overall decline in real per-capita social spending. Wilhelm et al. (2005) find similar results for a small set of developing countries: they emphasise the possibility that spending in sectors—primary education being an exception—that are generally seen as pro-poor actually tended to benefit the richer quintiles of the population. My results are also in line with those reported by Fiszbein (2014) for a large set of countries. Data limitation prevents me from replicating their test, but I expect their findings to be extended to Europe as well[14]. However, they are contrary to those for developing countries. For example, Mehmood et al. (2010) document a negative relationship between government spending and poverty reduction in Pakistan and mention similar results for other countries.

Results regarding *Local Expenditure* (as a share of total public expenditure) are also interesting (Table 4). A high share of local expenditure contributes to an increase in poverty. This is not counterintuitive—Musgrave (1959) had already stressed the perverse effect of local finance (tax and expenditure) on distribution more than half a century ago. Although local expenditure is not synonymous with fiscal federalism, it is still correlated with tax and expenditure autonomy at local level. Interquartile differences indicate that for the purpose of poverty reduction, local budget autonomy is not recommended in countries where poverty is high.

6.3 Poverty and the Labour share of income

Unsurprisingly, poverty increases when the share of national income going to workers decreases. The results are statistically significant, particularly for high quantiles (high probability of poverty). Interaction with initial *GINI* shows that the combination of a declining share of labour income and a high initial inequality hits poverty hard. Notice that labour share has long been considered stable but the recent *secular* (ILO, 2015) downward trend witnessed in at least the developed countries is attracting attention. For a data set larger than that used in the present paper, the ILO (2015, 6) reports a generalised decline of labour share in almost all the G20 countries, with very large falls observed in Europe in general and Italy in particular. The European Commission (2007, 237–72) has documented similar downward trends. Notice that the empirical evidence indicates that the decline in the wage share is especially strong for low-skilled workers. Charpe (2011, 58) reports that in advanced economies the share of wages earned by low-skilled workers fell by 12 percentage points between 1980 and 2005. Interaction with *Per capita income* (see above) is statistically significant and the interquartile differences signal that conditional mean estimation obscures possible cross-country differentiated effects. Poverty reduction is stronger when *Per capita income* interacts with a high value of labour share. This means that in countries having similar level of *Per capita income,* poverty reduction is made easier if a larger share of national income goes to the

[13] A correlation analysis between program characteristics and indicators of program effectiveness and efficiency for some Central and Eastern European countries can be found in Avram (2016). Results indicate that social assistance programs achieve only limited poverty reduction and end up spending a significant amount of their budget on the non-poor.

[14] Using EU-SILC data, Hidalgo-Hidalgo et al. (2013) found that public expenditure in education may reduce the probability of being poor as an adult. In particular, public spending on *primary* education has a strong effect in helping individuals rise above the poverty line.

working class. In other words, arresting the decline in the wage share can help put the exit from poverty on a more sustainable path. Moreover, the estimates of marginal variations and elasticities are high and significant and signal a potentially strong favourable effect on poverty reduction. Yet, the positive impact of an increase of the labour share diminishes when we move from low to high quantiles and this implies that when the probability of poverty is abnormally high, even the effectiveness of this important cofactor inevitably gets hampered. We may conclude by concurring with Atkinson (2009) that in the absence of extreme poverty conditions and with declining labour shares, the improvements in macroeconomic performance may not translate into commensurate improvements in personal incomes of households. Putting it differently, and as stressed by Piketty (2013), a higher capital share is associated with higher inequality and, as shown in this paper, with higher levels of poverty.

6.4 Poverty, Education, and Technical progress

Top education diminishes poverty risk by favouring social mobility but only when the probability of poverty is already low (Table 1). However, even at low quartiles, the estimated effect is barely significant and not strong. For this reason, the simulated effects of marginal variations and elasticities reported in 6.1 do not include top education. My results are not entirely in accordance with the expansive previous literature, which focuses mainly on primary and secondary education[15]. Primary and secondary education are widely perceived to a) have a key role in reducing poverty; b) be positively associated with development-related outcomes, such as improvement in productivity; and c) reduce the intergenerational transmission of poverty. On the contrary, the effects on poverty of *tertiary* education achievements of young graduates may be more controversial. Still, results show that tertiary education contributes to poverty reduction when the probability of poverty is low (Q_{10} and Q_{25}), that is, when poverty may be a mere by-product of market failures, as it is for instance, in the credit or professional sectors. Hence, in these cases high-level education can contribute to the alleviation of occasional and transitory poverty by reducing moral hazard and selection problems in some markets, with an indirect favourable effect on investment and employment. On the contrary when the probability of poverty is high (Q_{75} and Q_{99}) and initial Gini is high too, top education produces opposite results. This means that in those countries, social mobility receives a small support by top education and that access to high professions and carriers requiring top education is still limited to a rich fraction of the young generations. Under these conditions, education has no positive externalities on the risk of poverty. The above considerations extend to Technical progress (proxy is Patent registrations) which affects poverty only at the lowest quantiles.

6.5 Poverty, Democracy, and the Quality of institutions

Having a long-standing democracy is good for poverty reduction. Notice, moreover, that the effect is more pronounced from median to high quantiles of poverty distribution (see Table 6 for a first visual impression). Altogether, having a long-standing democratic tradition reduces the risk of falling into extreme poverty. However, since political (and electoral) corruption may hamper and distort a free and massive participation in political life through the democratic institutions, my results also imply that the reduction of poverty risk can be larger when occasions for political-electoral-administrative corruption are low. That is why the favourable effects of democracy diminish with poor institutional quality (i.e., when *CPI* and *LAW* are low): the low quality of the institutions of a democratic country makes the distributional consequences of a potentially massive political participation less effective, and as a result, the interaction between democracy and corruption produces statistically significant poverty-increasing results.
CPI and *Rule of law* produce estimated coefficients that are statistically significant and show the expected signs. The effectiveness of government activity can be seen as a proxy for the extent to

[15] A recent paper of Giarda et al. (2017) shows that in a multilevel model high (*not top*) education reduces poverty in Italy France, Spain and the UK (Tables 12, 13, 14). Analogous results in Bosco et al. (2016).

which the administrative machine fulfils its obligations. A positive perception of the quality of public action (both variables) reduces exposure to poverty risk in any version of the model. Recalling that the scale of CPI is 0–10, a one percent increase in honesty (i.e., a one percent increase in CPI) would imply, on average, a 7 percent reduction in the exposure to poverty risk, ceteris paribus. These findings accord with previous results (Gupta et al., 2002; Bosco et al., 2016). However, interquartile differences signal that the effect depends on the 'segment' of the probability distribution of poverty. As stressed by Donchev et al. (2013), perception indices are influenced by absolute (as opposed to relative) levels of the variable at hand (for instance corruption) and this tends to penalise large countries. In particular, CPI exhibits diminishing sensitivity to both absolute and relative corruption, indicating that it may capture better the differences among countries *with low levels of corruption* than those among highly corrupt ones (Bosco, 2016).

7. Concluding comments

In this paper, I have investigated the relationship between vulnerability to poverty and social exclusion and various economic and non-economic factors for a set of 31 European countries by using a QR framework. The results indicate that despite being fundamental, a pure increase in per capita income might not be helpful in reducing poverty across countries and across poverty quantiles. At the same time, results show that political and institutional elements are of significant importance as factors determining poverty persistence and poverty differences across European countries. Yet, QR estimates show, among other things, that the share of *GDP* going to the working class (possibly a political rather than a pure economic factor) significantly affects poverty and interacts with income, political, institutional, and distribution cofactors in determining poverty risk. The results show that improvements in macroeconomic performance and public life quality may not translate into commensurate improvements in personal incomes of households because of declining labour income shares. In other words, a higher capital share may be associated with higher poverty: wage restraint does not lead to higher growth or poverty reduction.

With respect to this last result, the general picture that emerges from these QR estimates ca be epitomised by the following famous statement of Keynes in *The Economic Consequences of the Peace* (insertion and underlying mine):

'*This remarkable system* [the capitalist market system] *depended for its growth on a double bluff or deception. On the one hand the laboring classes accepted from ignorance or powerlessness, or were compelled, persuaded, or cajoled by custom, convention, authority … into accepting a situation in which they could call their own very little of the cake, that they and Nature and the capitalists were cooperating to produce. And on the other hand, the capitalistic classes were allowed to call the best part of the cake theirs and were theoretically free to consume it, on the tacit underlying condition that they consumed very little of it in practice*' (J. M. Keynes, 1919).

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Appendix: Tables

Tab. 1 *Simultaneous QR estimates of RPSE (Model 1). t-stats in parentheses with bootstrap (20) SEs. Observations 194*

	Q_{10}	Q_{25}	Q_{50}	Q_{75}	Q_{99}	*LS with Country Dummy*
Per-capita Income	–.0013***	–.0019***	–.0018***	–.0015***	–.0008***	–.0019***
	(–3.27)	(–7.14)	(–8.54)	(–12.91)	(–3.11)	(–5.04)
GINI(t=0)	.68**	.66***	.56***	.70***	.86***	.56**
	(3.71)	(6.32)	(3.45)	(4.61)	(5.82)	(3.15)
CPI	–.55*	–.63*	–1.35*	–1.06**	–.52	–2.25*
	(–2.45)	(– 2.19)	(–2.13)	(–3.41)	(–1.28)	(–2.73)
Tot. Public	–.06	–.14*	–.13**	–.06	–.003	–.13
Expenditure/GDP	(–.74)	(–2.20)	(–2.44)	(–.79)	(–.04)	(–1.54)
Labor Share of Income	–10.35**	–12.01***	–14.44***	–11.92***	–8.50**	–9.24***
	(–3.22)	(–3.71)	(–3.95)	(–5.17)	(–2.97)	(–3.99)
(Per-capita Income)^2	1.03e^{-8}**	1.66e^{-8}***	1.62e^{-8}***	1.33e^{-8}***	7.11e^{-9}**	1.72e^{-8}**
	(3.11)	(4.32)	(4.74)	(6.53)	(2.88)	(3.74)
Per-capita Income×	–.10*	–.13**	–.17**	–.14**	–.15**	–.17**
Labor Share of Income	(–2.83)	(–3.43)	(–3.73)	(–3.63)	(–3.93)	(–3.73)
Per-capita Income× *CPI*	–.002***	–.003***	–.004***	–.009***	–.007**	–.002**
	(–4.42)	(–4.62)	(–4.22)	(–4.79)	(–2.79)	(–2.22)
D_0	9.93*	14.40***	13.75***	10.73***	5.55	10.71***
	(2.20)	(6.16)	(4.80)	(5.20)	(1.91)	(3.89)
Top Education	–.021**	–.011	–.024	–.021	.022	–.022
	(–2.99)	(–1.63)	(–1.31)	(–1.33)	(1.03)	(–1.33)
Constant	31.14	48.24***	57.88***	52.30***	13.96	
	(2.06)	(6.24)	(7.37)	(6.14)	(1.27)	
Pseudo R^2	.45	.53	.64	.73	.46	.49

This table presents QR regression results for tests that examine the effect of cofactors on the probability of poverty in a country. I report heteroscedasticity robust standard errors (t-values in parenthesis) clustered by country. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Tab. 2 *Average marginal effects on RPSE and elasticities of some factors with QR and OLS (Model 1). z-stats in parentheses*

	QR		*LS*	
	dy/dx	*η*	*dy/dx*	*η*
Per-capita Income	–.0007**	–.775**	–.0021**	–1.03**
	(–3.38)	(–3.34)	(–3.08)	(–3.44)
GINI (t=0)	.68**	1.12***	.79***	1.98**
	(3.71)	(3.79)	(3.91)	(2.89)
CPI	–.52	–.20	–1.01	–2.21*
	(–1.45)	(– 1.43)	(–1.85)	(– 2.03)
Tot. Public Expenditure/GDP	–.06	–.14	–.06	–.38
	(–.74)	(–0.74)	(–.84)	(–0.94)
Labor Share of Income	–10.35***	–.30**	–11.69**	–1.00**
	(–3.12)	(–2.98)	(–3.15)	(–2.99)
Dummy Democracy	9.93*	.30*	3.93*	4.30**
	(2.20)	(2.21)	(2.51)	(2.91)

Heteroscedasticity robust standard errors (t-values in parenthesis) clustered by country are used. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Tab. 3 *F test of interquartile differences for some coefficients (model 1)*

	$q_{10} = q_{50} = q_{99}$	$q_{10} - q_{50}$ $q_{10} - q_{99}$
All coefficients	11.29***	
Per-capita Income		3.19**
GINI		1.12**
CPI		.75
Tot. Public Expenditure/GDP		1.37
Labor Share of Income		1.05*

Tab. 4 *Simultaneous QR estimates of RPSE (Model 2). t-stats in parentheses with bootstrap (20) SEs. Observations 194*

	Q_{10}	Q_{25}	Q_{50}	Q_{75}	Q_{99}	*LS with Country Dummy*
Per-capita Income	–.0013***	–.0019***	–.0018***	–.0015***	–.0008***	–.0019***
	(–3.27)	(–7.14)	(–8.54)	(–12.91)	(–3.11)	(–5.04)
GINI(t=0)	.68**	.66***	.56***	.70***	.86***	.56**
	(3.71)	(6.32)	(3.45)	(4.61)	(5.82)	(3.15)
LAW	–.55	–.63*	–1.35*	–2.06**	–.52	–2.25*
	(–1.45)	(– 2.19)	(–2.13)	(–3.41)	(–1.28)	(–2.73)
Social Expenditure/GDP	–.06	–.14*	–.13**	–.06	–.003	–.13**
	(–.74)	(–2.20)	(–2.44)	(–1.79)	(–1.94)	(–2.54)
Share of Local Expenditure	–.02*	.02	.03**	.04**	.05**	.02*
	(–2.39)	(1.79)	(2.89)	(2.87)	(2.77)	(2.31)
Labor Share of Income	–10.35**	–12.01***	–14.44***	–11.92***	–8.50**	–9.24***
	(–3.22)	(–3.71)	(–3.95)	(–5.17)	(–2.97)	(–3.99)
(Per-capita Income)^2	1.01e^{-8}**	1.66e^{-8}***	1.61e^{-8}***	1.03e^{-8}***	7.01e^{-9}**	1.32e^{-8}**
	(3.21)	(4.12)	(6.74)	(10.53)	(2.88)	(3.14)
Per-capita Income× Labor Share of Income	–.10*	–.13**	–.17**	–.14**	–.15**	–.17**
	(–2.83)	(–3.43)	(–3.73)	(–3.63)	(–3.93)	(–3.73)
Per-capita Income× Law	–.0011***	–.0013***	–.0010***	–.0001***	–.0001	–.0012**
	(–3.52)	(–4.62)	(–3.22)	(–4.79)	(–1.79)	(–2.42)
D_0	9.93*	14.40***	13.75***	10.73***	5.55	10.71***
	(2.20)	(6.16)	(4.80)	(5.20)	(1.91)	(3.89)
Top Education	–.021**	–.011**	–.024	–.021	.022	–.022*
	(–2.99)	(–2.63)	(–1.31)	(–1.33)	(1.03)	(–2.11)
TEC INDEX	–0.03	–0.03*	–0.02	–0.01	0.003	–0.01
	(–2.08)	(–2.38)	(–1.4 8)	(–1.02)	(1.98)	(–1.69)
Constant	31.14	48.24***	57.88***	52.30***	13.96	
	(2.06)	(6.24)	(7.37)	(6.14)	(1.27)	
Pseudo R^2	.45	.53	.64	.73	.46	.49

This table presents QR regression results for tests that examine the effect of cofactors on the probability of poverty in a country. I report heteroscedasticity robust standard errors (t-values in parenthesis) clustered by country. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Tab.5 *Average marginal effects on RPSE and elasticities of some factors with QR and OLS (Model 1). z-stats in parentheses*

	QR		*LS*	
	dy/dx	*η*	*dy/dx*	*η*
Per-capita Income	–.0006*** (–6.08)	–.53*** (–5.46)	–.0011*** (–4.09)	–.71*** (–5.46)
GINI	.66** (7.29)	1.05*** (7.17)	.86** (6.22)	1.15*** (7.02)
LAW	–3.21** (–3.46)	.07 (0.83)	–3.21** (–3.46)	.07 (0.83)
Social Expenditure	.60 (1.95)	.13 (1.86)	.68* (2.15)	.33 (2.06)
Labor Share of Income	–3.26** (–2.58)	–.073 (–1.11)	–3.21 (–1.08)	–.073 (–1.01)
Top Education	–6.36 (–1.11)	–.26 (–1.32)	–3.35* (–2.11)	–.33 (–1.92)
Dummy Democracy	6.46*** (4.06)	.19*** (4.13)	5.66*** (6.01)	.11*** (4.73)

Heteroscedasticity robust standard errors (t-values in parenthesis) clustered by country are used. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Tab. 6 *F test of interquartile differences for some coefficients (model 2)*

	$q_{10} = q_{50} = q_{99}$	$q_{10} - q_{50}$ $q_{10} - q_{99}$
All coefficients	11.29***	
Per-capita Income		3.19**
GINI		1.12**
LAW		.75
Social Expenditure/Total Expenditure		1.37
Labor Share of Income		1.05*