

# Progressivity of personal income tax and background-related earnings advantages: evidence from Italy and Poland\*

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## Abstract

This paper analyses the impact of personal income tax redistribution on the link between parental characteristics and children's earnings in two large European countries – Italy and Poland – with comparable levels of inequality and background-related earnings advantages but large differences in the degree of tax progressivity. Using data from the 2011 wave of the European Union Statistics on Income and Living Conditions, we provide estimates of the intergenerational link at the mean and at different percentiles of the children's earnings distribution by considering alternatively gross or net earnings of the second generation to measure background-related monetary or rank advantages. As expected, we find that personal income tax reduces the size of the intergenerational link mostly because of a decrease in earnings inequality due to taxation rather than to a re-rank of children along the distribution. Therefore, the higher the tax progressivity, the higher the inequality reduction and the lower the intergenerational link. This result is particularly strong at top of the children's earnings distribution, where earnings inequality is considerably higher than in the rest of the earnings distribution in both countries analyzed.

**JEL Classification:** J62, D63, H24. **Keywords:** intergenerational link, tax redistribution, earnings inequality, socioeconomic mobility

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# 1 Introduction

A growing strand of the economic literature has investigated the transmission of socioeconomic advantages between parents and offspring. Scholars have mostly focused their attention on measuring the degree of income persistence across generations, or, when information on parental incomes is not available, on estimating the link between parents' socioeconomic characteristics (e.g., education, occupation) and children's earnings at middle ages (Black and Devereux, 2011; Raitano and Vona, 2015b,a). Independently on the empirical approach adopted, cross-country comparisons agree that Northern countries are the most mobile, while the UK and Southern European countries are, among European countries, the ones with the lowest degree of intergenerational mobility (Blanden, 2013; Corak, 2013).

However, these studies make use of gross or net incomes according to data availability, without inquiring in depth what is the role played by tax redistribution in affecting the extent of the link between parental characteristics and offspring's income. To the best of our knowledge, only Landersø and Heckman (2017) have analyzed the influence of tax redistribution on the intergenerational link. Comparing the cases of Denmark and the US, Landersø and Heckman (2017) find that most of the large estimated difference in the intergenerational income elasticity between these countries derives from the redistributive effect of taxes which decreases inequality much more in Denmark than in the US.

However, Landersø and Heckman (2017) only focus on a specific parameter of the children's earnings distribution – the mean – while the influence of tax redistribution on the link between parents' features and children's income is very likely to differ along the children's earnings distribution due to the interplay of three factors: i) the degree of tax progressivity which varies along the children's gross earnings distribution; ii) the probability of children coming from a different background of lying in different parts of the income distribution and, then, being burdened by different tax rates – i.e. the probability of children of being included in different tax brackets; iii) possible income gaps within the same tax bracket between children coming from different backgrounds. In this article we aim at inquiring the influence of personal income tax on the link between parents' characteristics and children incomes (henceforth, the intergenerational link), shedding lights on the role played by these three factors.

To this end, making use of the 2011 wave of the (European Union Statistics on Income and Living Conditions (EU-SILC), which includes a retrospective module on

parents' characteristics, we focus on 2 major EU countries – Italy and Poland – characterized by similar levels of intergenerational mobility but large differences in the personal income tax (PIT) schedule. In detail, Italy has a rather progressive PIT, whereas Poland applies a sort of flat rate taxation (see Section 2).

We estimate the link between parents' background and both gross and net labour incomes of their children when adult, to assess the size of the change of the intergenerational link due to tax redistribution. Furthermore, on the one hand, we assess the role played by tax progressivity on the intergenerational link by comparing the Italian and the Polish cases; on the other hand, we improve the knowledge about the mechanisms behind the intergenerational link and the influence of tax redistribution on this association by analysing how this influence changes along the children's earnings distribution.

To measure the influence of tax redistribution on the intergenerational link along the children's earnings distribution, we regress children's earnings on proxies of parental background using both OLS and Unconditional Quantile Regressions (UQR). Moreover, because PIT may affect the intergenerational link both re-ranking individuals coming from different backgrounds and reducing the earnings inequality between them, we distinguish these two influences by comparing estimates of the intergenerational link obtained using log children's earnings or their percentile in the earnings distribution as dependent variable. Indeed, though individuals' percentiles may change when we move from gross to net earnings due mainly to the effect of social contributions, we show that the extent of re-ranking moving from gross to net income is basically independent to parental background. This is the reason why by comparing results obtained considering log earnings and percentiles as the dependent variable we can decompose the estimated variation of children's earnings with respect to our proxy of parental background in a component associated to earnings inequality at any specific parameter of interest (i.e. the mean or the specific percentile) and the correlation between the children's position over the distribution and parents' background.

Accordingly, our findings show that an important fraction of the intergenerational link is due to earnings inequality within the various parts of the income distribution rather than to the correlation between parents' background and the percentile of the income distribution achieved by the child. As a consequence, personal income taxes decrease the intergenerational link almost exclusively by reducing, at any given quantile of the distribution, the earnings differences between children coming from different parental backgrounds. Therefore, for a given association between parent's background

and children’s percentiles, the higher the tax progressivity, the stronger the decrease in the intergenerational link, as confirmed by results concerning Italy and Poland.

Because our results show that the Polish “almost flat” tax regime has a very limited effect on the size of the intergenerational link, in the final part of the paper we carry out an arithmetical simulation on net earnings in Italy if a “slightly dual” income tax – aimed at reducing both the amount and the progressivity of the PIT – would replace the current tax schedule (assuming no behavioural changes by workers and firms after the reform) to analyse how this possible reform would affect the intergenerational link along the children’s earnings distribution. As expected, confirming our previous results, we find that this reform would unquestionably worsen the intergenerational link.

The paper is structured as follows. Section 2 compares the PIT system in Italy and Poland. Section 3 presents the data, the sample selection and the variables we use to summarize the characteristics of parental background. Section 4 presents the empirical methodology followed to estimate the intergenerational link and to assess the mechanisms behind the influence of the PIT on the intergenerational link. Section 5 shows our main results obtained exploiting both OLS (Section 5.1) and UQR estimates (Section 5.2) and simulating changes in the intergenerational link if the “dual tax” fiscal reform would change children’s net earnings. Section 6 concludes highlighting the main policy implications of our findings.

## 2 Why comparing Italy and Poland

Apart from some issues related to data availability for other countries (see Section 3), we focus on Italy and Poland since, on the one hand, the economic literature found that both countries are characterized by a low level of intergenerational mobility, while, on the other hand, these countries largely differ as concerns the characteristics of the PIT.

As concerns the degree of intergenerational mobility, some studies have measured the intergenerational earnings elasticity (IGE) in Italy using either net (Mocetti, 2007; Piraino, 2007) or gross earnings (Barbieri et al., [ming](#)), finding that Italy belongs to the low mobility cluster within developed countries, and the picture of low mobility does not change if parents’ characteristics (e.g., education, occupation) rather than parental income are used to proxy parental background (Franzini and Raitano, 2009; Raitano and Vona, 2015b,a). No estimates of the degree of intergenerational earnings persistence have been carried out for Poland, but OECD (2018) compares several indexes of

intergenerational mobility in several OECD countries finding that Italy and Poland are characterized by similar (low) levels of social mobility.

As concerns the personal income tax schedule large differences between Italy and Poland emerge (see 1 ). Indeed, the Italian PIT is far more progressive than the Polish

Table 1: Tax rates and brackets in Italy and Poland in 2010

Italian tax system	
Tax bracket	Tax rate
0 - 15000.0 €	23%
15000.0 € - 28000.0 €	27%
28000.0 € - 55000.0 €	38%
55000.0 € - 75000.0 €	41%
Over 75000.0 €	43%
No tax area	
Employees: 0 - 8000 €	
Self-employed workers: 0 - 4800 €	
Polish tax system	
Tax bracket	Tax rate
0 - 21435.6 €	18%
Over 21435.6 €	3719.1 € + 32% on income over 21435.6 €
No tax area	
0 - 774.2€	

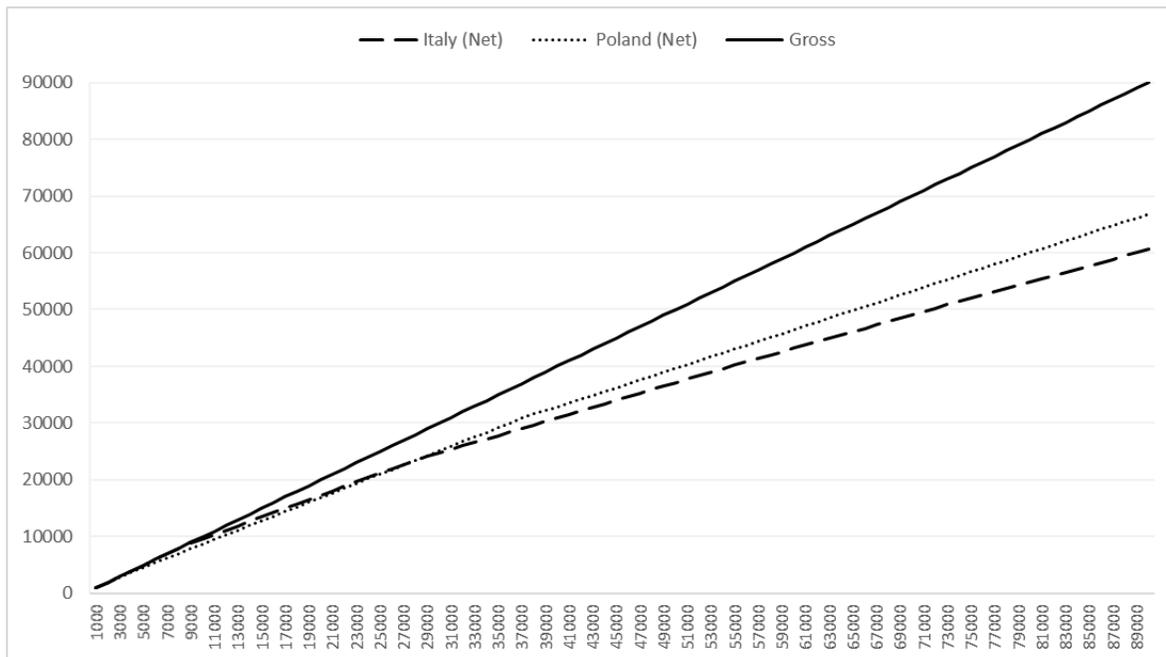
**Source:** Italian Tax Revenue Agency Online Annual Report 2010 (Part III) and PKF Poland Tax Guide 2010

one, as evident comparing the number of the tax brackets, the tax rates and the extent of the no tax area. For comparison, Figure 1 shows the relationship between gross and net earnings in Italy and Poland when incomes are made comparable across countries by using PPPs .

According to the differences in the PIT schedule in the two countries, the reduction in earnings inequality due to PIT should be lower in Poland than in Italy. This means that the degree of the intergenerational link – that is affected by both the probability of achieving a certain quantile of the earnings distribution according to parental background and the inequality of the earnings distribution – should be less affected by personal income taxes in Poland than in Italy.

However, there has been some debat in Italy about the opportunity of introducing a

Figure 1: Fiscal curves expressed in Euro PPP ESA 2010



**Source:** Authors’ elaborations on the 2011 EU-SILC wave.

fiscal reform aimed at largely reducing the number of tax brackets and tax rates. Indeed, the new tax system – commonly labelled as a “flat tax” system or, more properly, as a dual tax system – would be characterized by only two tax rates of 15% and 20%, paid, respectively, on annual gross individual incomes below or beyond 80,000 euros, plus a general deduction of 3,000 euros benefiting individuals whose total income is below 35,000 euros. Accordingly, if a reform of this form would be implemented, the Italian tax system would become closer to the Polish one, with potential consequences in terms of both current inequality and intergenerational transmission of economic advantages. In particular, we expect that the lower degree of tax progressivity resulting from the fiscal reform – reducing the degree of tax redistribution – would increase the intergenerational link, particularly at the top of the income distribution where income inequality is very high and the tax rate reduction would be the highest.

### 3 Data and sample selection

We use data from the EU-SILC 2011 wave which provides comparable cross-sectional microdata regarding individual incomes, living conditions and other socioeconomic as-

pects for many European Member States and includes a specific module where retrospective socioeconomic information about parents of the respondents – e.g., their education or the occupation when the respondent was aged around 14 – is recorded.

We focus on Italy and Poland for two main reasons. The first regards the aforementioned similarities in the indexes of current inequality and intergenerational mobility and differences as concerns the features of the PIT. The second concerns some limits to our scopes of data recorded the EU-SILC 2011. Indeed, among the major EU countries, only in Italy and Poland we have detailed information about both gross and net labour incomes of personal income taxes and information about various characteristics of parental background<sup>1</sup>.

According to data at our disposal, we follow [Raitano and Vona \(2015b\)](#) and [Raitano et al. \(2016\)](#) to build an index of parental background using all available fathers' and mothers' background characteristics recalled by children. In detail, we built a distribution of parental background using detailed information on family characteristics in a hierarchical order. Firstly, following the socio-economic literature (e.g., [Granovetter, 1995](#)) that stresses that parental occupation is a good proxy for the influence of the family on sons' outcomes as it encompasses unobservable aspects of human capital, socio-economic status and family networks, we rank individuals according to the highest occupation achieved by the father or the mother (coded through 1-digit ISCO); secondly, individuals with the same parental occupation are ranked according to parents' highest educational attainment and then to the occupation and education attained by the parent with the lowest attainments. Finally, for those having the same fathers' and mothers' education and occupation, we smooth the background distribution using information about the country of birth of fathers and mothers, about the presence of both parents in the household, the number of siblings (sorted in descending order), the number of income recipients in the household, the year of birth of the father and the mother (sorted in descending order). This procedure allows us to derive a smooth distribution of social origins. Then, we exploit the terciles of this distribution of parental social positions as the proxy of family background.

As a measure of children's economic status, we use yearly labour income, obtained as the sum of employment or self-employment income plus the monetary values of fringe

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<sup>1</sup>Within major EU countries information on net incomes is not recorded in Germany, the UK and all Northern countries apart from Sweden. However, sample size is very small for Sweden since parental information are asked to household heads only. Moreover, we can not consider France as income taxes are computed at the household level rather than at the individual level.

benefits paid by the employer. To reduce the amount of lifecycle bias deriving from the use of yearly rather than permanent earnings, we restrict our analysis to all children aged 30 to 54. This selection rule is compatible with the rule of thumb proposed by [Haider and Solon \(2006\)](#) and [Böhlmark and Lindquist \(2006\)](#) which suggest to observe children at mid-career to reduce the downward bias arising when the second generation is taken at early stages of their working career<sup>2</sup>. Table 2 shows some descriptive statistics

Table 2: Summary statistics

	Italy			Poland		
Earnings	Gross	Net	Variation	Gross	Net	Variation
mean	28,037.8	19,827.1	-29.3%	16,510.8	12,295.9	-25.5%
sd	27,286.9	16,517.3	-39.5%	29,681.9	22,243.2	-24.8%
Gini	0.356	0.319	-10.4%	0.362	0.366	2.8%
p90	48,200.7	32,096.5	-33.4%	29,681.9	22,243.2	-25.1%
p50	24,414.5	18,220.6	-25.4%	13,783.5	10,310.8	-25.2%
p10	7,865.5	6,483.1	-17.6%	5,193.5	3,676.9	-29.2%
	Children's age					
mean	41.96			41.30		
sd	6.80			7.32		
Obs.	11,663			7,709		

**Notes:** Monetary values are expressed in euro PPP ESA 2010. All reported statistics have been computed using sample weights **Source:** Authors' elaborations on the 2011 EU-SILC wave.

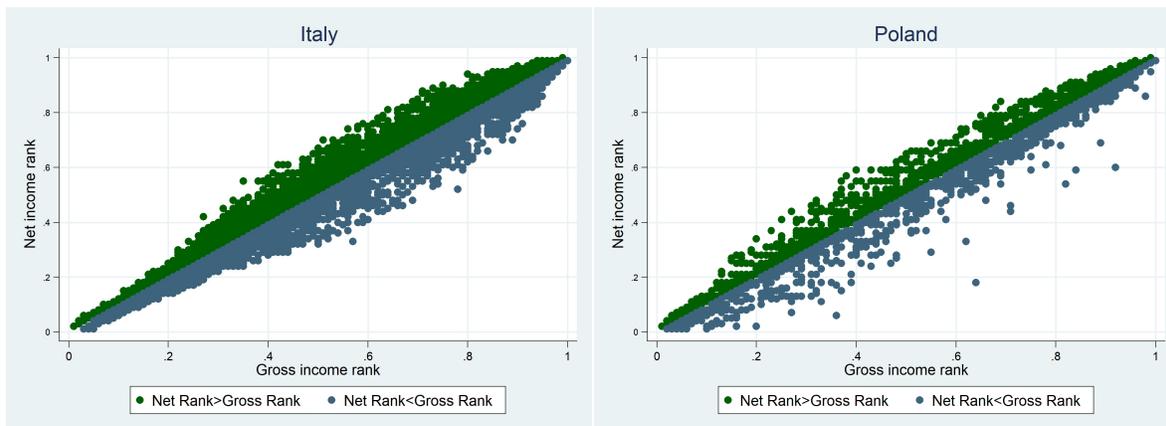
regarding selected children in the final samples for both countries considered. The Gini indexes computed on gross income show comparable levels of gross income inequality in the two countries analyzed. However, consistently to differences in tax progressivity between the two countries described in Section 2, the influence of personal taxes on earnings dispersion is considerably higher in Italy than in Poland so that net income inequality is lower in Italy than in Poland. Furthermore, the comparison between

<sup>2</sup>When we build the sample of children, we also exclude workers that were not born in the country to avoid a bias due to the influence of the country of birth's institutional and cultural characteristics on the intergenerational transmission of economic advantages, and those who are affected by any form of disability, since they can not properly exploit all potential advantages deriving from parental background.

the various percentiles of the gross and net earnings distribution shows that the tax redistribution at the top of the distribution is much higher in Italy than in Poland.

Eventually, Figure 2 shows that, the extend of re-ranking moving from gross to

Figure 2: Re-ranking due to personal income taxation.



**Source:** Authors' elaborations on the 2011 EU-SILC wave.

next earnings is not negligible in the two countries analyzed though it is lower for those placed in both the upper and lower tails of the gross income distribution. This is mainly due to the effect of social contributions which are included in our measure of gross income whose value might differ between different workers' categories (e.g., between employees and self-employed). Moreover, tax deductions on individual income might also vary according to individual unobservables (e.g., medical expenses). However, Figure 1 shows that the extend of downward re-ranking is higher in Poland than in Italy.

## 4 Methodology

### 4.1 Estimates of intergenerational link at the mean

To provide an estimate of the link between children's economic status and parental background we estimate the following two equations:

$$\ln y_i = \alpha + \beta High_i + \omega Med_i + X_i \theta + \epsilon_i \quad (1)$$

$$rank(y_i) = k + \gamma High_i + \eta Med_i + X_i \delta + v_i \quad (2)$$

where  $lny_i$  is the log of child's gross or net labour earnings;  $rank(y_i)$  is the percentile of the child's earnings in the child's gross or net earnings distribution respectively;  $High_i$  is the dummy for the highest tercile of the parental background distribution (obtained by following the approach discussed in Section 3);  $Med_i$  is the dummy for the 2nd tercile of the parental background distribution (the least advantaged tercile is, then, the omitted category in the estimates),  $X_i$  is a row vector of control variables which includes a second grade polynomial in age and a dummy for gender.

In this empirical framework, we choose the estimated coefficients  $\beta$  and  $\gamma$  as our baseline measures of background-related earnings advantages. The estimated  $\beta$  expresses the percentage earnings advantage of children's from the highest parental background with respect to workers whose parents were in the first tercile of the parental background distribution. As the probability limit of our estimated  $\beta$  depends on the correlation between children's earnings and parental background multiplied by the ratio between the standard deviation of children's earnings and that of the dummy  $High_i$ , cross-country differences in the intergenerational link depend basically on two main factors: i) differences in earnings inequality between the two countries; ii) cross-country differences in the relative position of children with the highest parental background in the earnings distribution. Therefore, for any given correlation between children's position in the income ladder and parental background, the higher the earnings inequality, the larger the estimated  $\beta$ . Similarly, for any given degree of earnings inequality, the more the probability of being located in the highest quantiles of the earnings' distribution increases as we move from the lowest to the highest category of parental background, the higher the estimated  $\beta$ . On the contrary, since percentiles of the earnings distribution have, by construction, the same standard deviation in any country, the estimated  $\gamma$  will depend only on cross-country differences in positional mobility and, thus, on variations in the probability of rising the income ladder according to parental background.

Therefore, by estimating both equations 1 and 2 using gross and net earnings and by comparing estimated coefficients we are able to highlights mechanisms behind an effect of PIT on the background-related earnings advantages. We may indeed distinguish the influence of PIT through changes in the relative position of children in the earnings distribution according to their background from the influence on the intergenerational

link engendered by the change of earnings inequality due to tax progressivity.

## 4.2 Estimates of background-related earnings advantages over the distribution

To obtain a measure of the link between parental background and gross or net earnings at different percentiles of the distribution, and to assess the influence of PIT progressivity on that link, we use the UQR (also called RIF regression), an estimation methodology firstly proposed by [Firpo et al. \(2009\)](#). The recentered influence function (RIF) of a specific parameter is obtained by adding up the Influence Function (IF) to the statistic of interest. The IF is widely used in robust statistics to evaluate the robustness of estimated parameters to the presence of outliers [Hampel \(1974\)](#) and it assumes different forms according to the chosen parameter. For instance, in the case of quantiles, it is possible to express the IF in the following forms, depending on the values that the variable of interest assumes, below or above the chosen quantile:

$$IF_{y < y_\lambda} = \frac{\lambda - 1}{f_\lambda}$$

$$IF_{y = y_\lambda} = 0$$

$$IF_{y > y_\lambda} = \frac{\lambda}{f_\lambda}$$

where  $y_\lambda$  are earnings at the  $\lambda$ th quantile and  $f_\lambda$  is the value of the density function at that specific quantile. Thus, by exploiting the law of iterated expectations, we can express the parameter of interest according to the following expression:

$$Q_\lambda = E[RIF(y; \lambda)] = E_x[RIF(y; \lambda)|X] = E(X\beta_\lambda)$$

Then, by re-expressing the conditional expectation as a linear function of covariates we obtain:

$$E[RIF(y; \lambda)|X] = X\beta_\lambda$$

where the parameter  $\beta_\lambda$  can be thus estimated by means of OLS, where the RIF of children's earnings is our dependent variable. In our case, the regressor of interest

is a dummy which assumes the values of 1 for individuals with the highest parental background, and 0 for the reference category of individuals whose parents belong to the lowest tercile of parental background.

According to this methodology, at the  $\lambda_{th}$  quantile, the marginal effect of parental background on children’s earnings depends on two distinct aspects. First, for any give density function, the more (less) the relative presence of individuals with a high parental background increases as we move above the quantile of interest, the higher (lower) the estimated  $\beta$  is. Secondly, for a given probability of ending up in a specific quantile depending on parental background, the less (more) concentrated around the  $\lambda_{th}$  quantile the earnings’ distribution is (i.e., the lower the value of the density function at the  $\lambda_{th}$  quantile) the higher (lower) the estimated parameter is.

Therefore, at any given quantile of interest the estimated  $\beta$  may varies across countries both because of a “composition effect” (i.e., the distribution of children by their parental background along the earnings’ distribution varies across countries) and because of a “wage structure effect” (i.e., given the same distribution of children by parental background, the “shape” of the earnings’ distribution varies across countries). On the contrary, when we compare estimated  $\beta_s$  obtained by considering gross and net earnings in a given country and at a certain quantile, the difference between the estimated parameter mainly depends on the influence of personal income taxes on the earnings distribution. In other terms, PITs tend to increase the concentration of earnings around the quantile of interest but – apart when the few cases where the tax schedule engenders re-ranking across individuals (e.g., due to some specific tax deductions, or to different tax and contribution rates applied to the various workers’ categories) – they should only marginally affect the relative position of individuals over the distribution (i.e., we should have a prevalence of the “wage structure effect”).

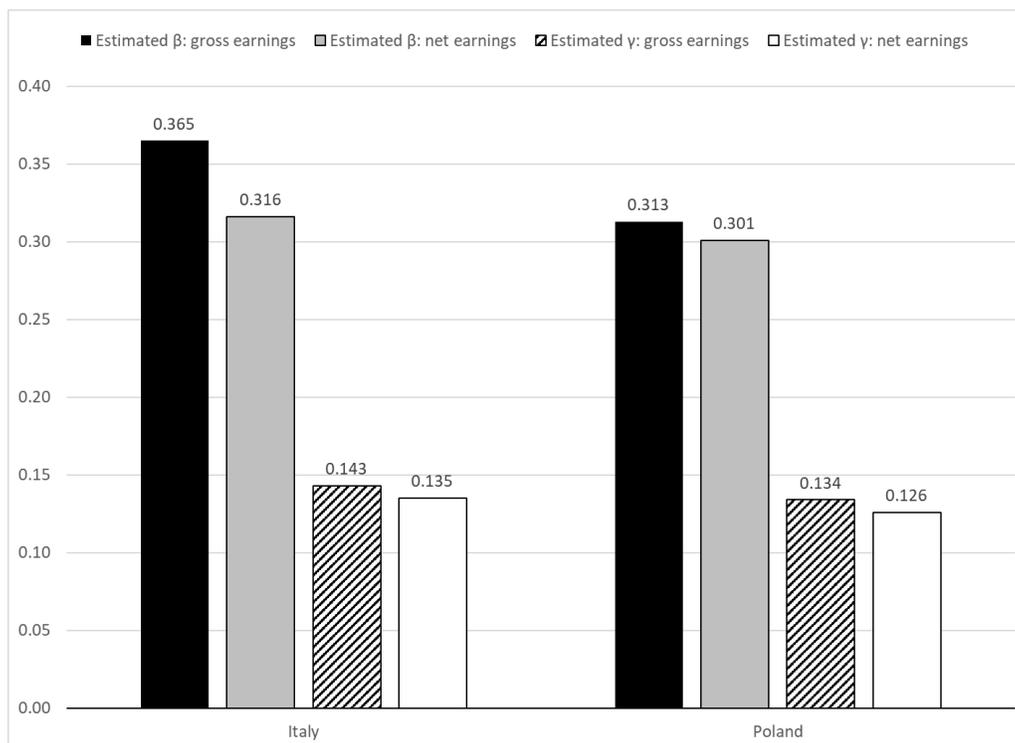
As in the case of the mean, we can distinguish between the composition effect and the wage structure effect of personal taxes by estimating our measures of backgroud-related earnings advantages at different parameters of the children’s earnings distribution. Accordingly, we estimate equations 1 and 2 for each selected quantile  $\lambda$  through the UQR previously described. Hence, while the estimated  $\beta_\lambda$  will depend on both the composition of workers in terms of parental background and on differences in the remuneration according to the tercile of origin, the estimated  $\gamma_\lambda$  will depend only on the composition factor since ranked earnings are, by construction, distributed as an uniform so that their density function will assume the same value at any given quantile.

## 5 Results

### 5.1 OLS results

In this section, we present the estimated  $\beta$ s and  $\gamma$ s in Italy and Poland at the mean of the children's earnings distribution (Figure 3). Looking at estimates obtained selecting

Figure 3: OLS estimates of the link between children's gross/net earnings and parental background



**Notes:** Reference category: children in the lowest tertile of the parental background distribution. Control variables included in the regressions but no showed are: a 2nd grade age polynomial and a dummy for sex. **Source:** Authors' elaborations on the 2011 EU-SILC wave.

children's gross earnings as the outcome variable in equation 1, we can confirm results provided by [OECD \(2018\)](#) which show that social mobility is low both in Italy and Poland, even if it is slightly lower in the first country. In detail, the estimated  $\beta$  for Italy is 0.365 – showing that children with parents in the highest tertile of the parental background distribution earn around 36% more than children with parents in the lowest tertile – while the estimated coefficient for Poland is 0.313.

When we move from gross to net earnings, the estimated coefficient very slightly reduces in Poland (it reduces by 3.8%), where, as remarked, tax progressivity is very low, while the reduction of estimated  $\beta$  is much larger in Italy (the coefficient estimated using net earnings is 13.4% lower than the coefficient computed for gross earnings) because of the previously described differences in tax progressivity.

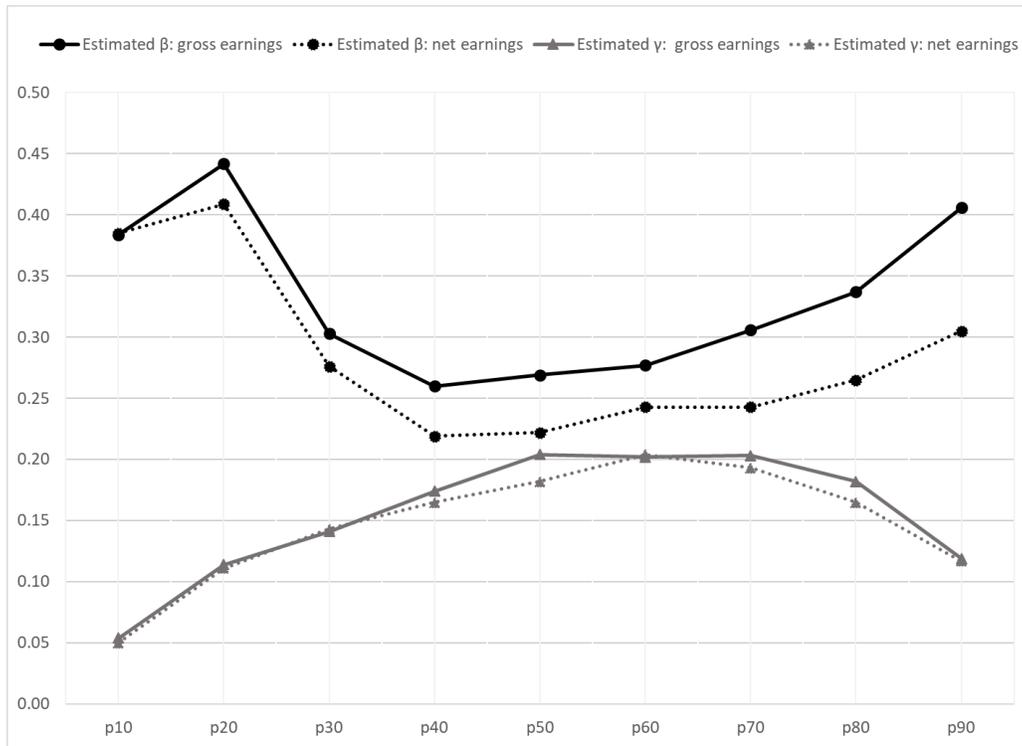
As pointed out, the estimated  $\beta$  depends on both the inequality in children’s earnings distribution and on background-related ranks in the earnings distribution. Using the child’s percentile in the earnings distribution rather than the log of the child’s earnings as the outcome variable in equation 2 we can thus disentangle the two mechanisms behind the intergenerational transmission of advantages. Estimated  $\gamma_s$  show that the background-related rank advantages are only a small fraction of the estimated  $\beta_s$  in the two countries, independently on the use of gross or net earnings as the outcome variable in equation 2. In particular, the expected variation in the child’s percentile moving from the lowest background category to the highest background category is about 13 percentiles. These results suggest that the bulk of the link between earnings and parental background at the mean of the earnings distribution is mainly related to earnings inequality. In this context, personal income taxes seem to influence the intergenerational link by reducing current earnings inequality. On the contrary, the extent of the ranking showed in figure 2 is mainly orthogonal to parental background.

## 5.2 UQR results

In this Section, we measure the influence of taxes on background-related advantages over the children’s earnings distribution. As in the case of the OLS estimates, we distinguish between the estimated  $\beta$  and  $\gamma$  to compare overall background-related earnings advantages with a background-related rank advantages. Given that ranks are distributed as an uniform so that they have a density function which does not vary from one percentile to another, at any given percentile of the children’ earnings distribution and for the two measures of earnings – gross or net of personal taxes – the higher the difference between the estimated  $\beta$  and the estimated  $\gamma$ , the more the intergenerational link is related to children’s earnings inequality rather than on background-related positional advantages.

As showed in Figure 4, the association between intergenerational and current inequality in Italy is particularly high at the top and bottom of the earnings distribution. On the contrary, in Poland it is more stable along the distribution with a peak at the 10th percentile (Figure 5 ).

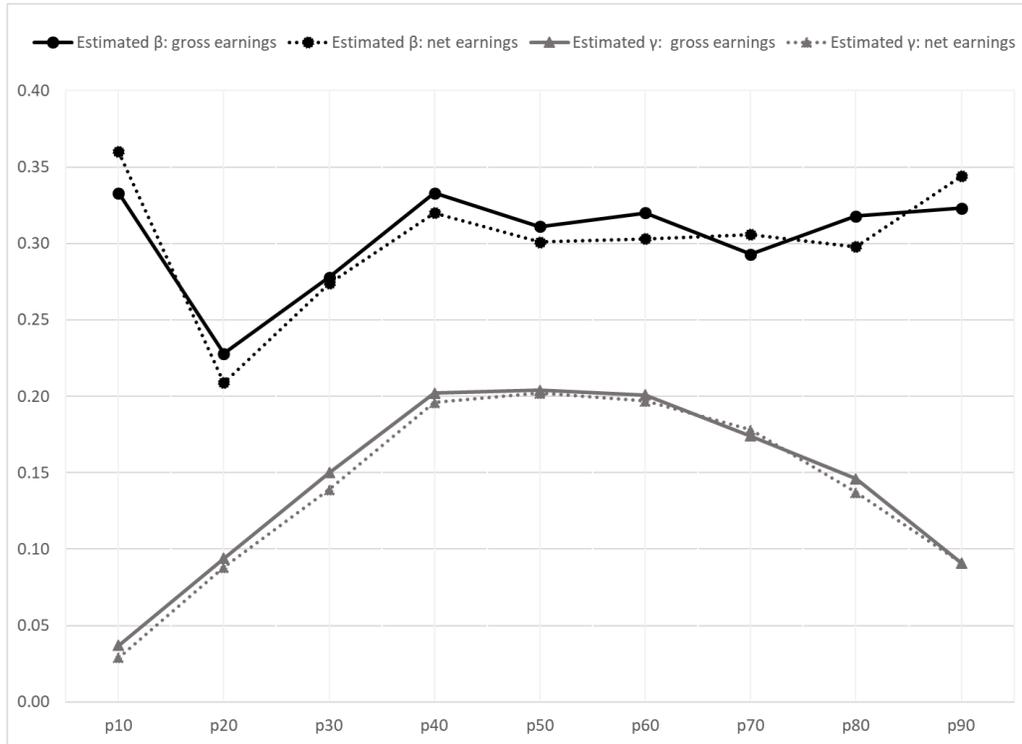
Figure 4: UQR estimates of the link between children’s gross/net earnings and parental background in Italy



**Notes:** Reference category: children in the lowest tertile of the parental background distribution. Control variables included in the regressions but no showed: a 2nd grade age polynomial and a dummy for sex. **Source:** Authors’ elaborations on the 2011 EU-SILC wave.

The influence of PIT can be instead evaluated for each selected quantile by looking at the difference between the estimated coefficients before and after including personal taxes. Results presented in the two figures show that, while in both two countries the influence of PIT on background-related ranks advantages is negligible – as shown by the comparison of the estimated coefficients regressing percentiles built on gross or net earnings – the influence of taxes on the intergenerational link is high in Italy starting from the 40th percentile of the children’s earnings distribution and higher at the top of the earnings distribution. On the contrary, the low degree of tax progressivity in Poland is not able to consistently reduce background-related advantages at any selected quantile of the children’s earnings distribution.

Figure 5: UQR estimates of the link between children’s gross/net earnings and parental background in Poland



**Notes:** Reference category: children in the lowest tertile of the parental background distribution. Control variables included in the regressions but not shown: a 2nd grade age polynomial and a dummy for sex. **Source:** Authors’ elaborations on the 2011 EU-SILC wave.

### 5.3 Background-related advantages in Italy applying the dual tax system

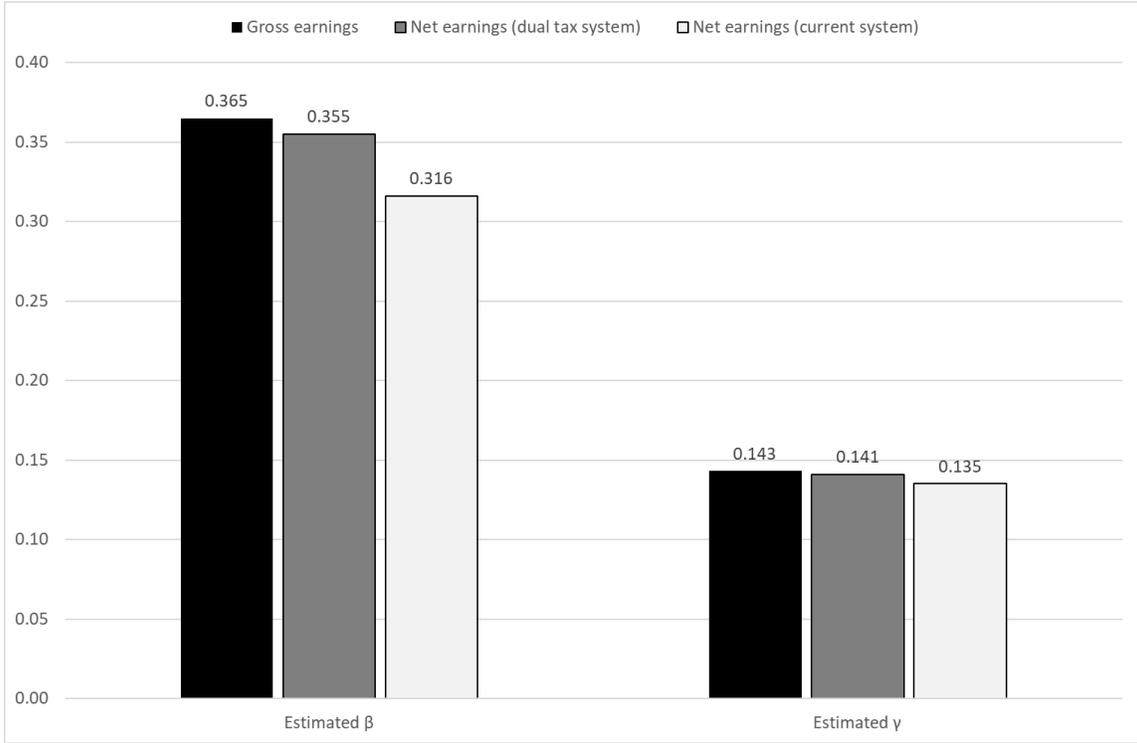
In this section we present some simulations of the change of the intergenerational link at the mean and at different quantiles of the children’s earnings distribution that would emerge if Italy would introduce the dual tax system discussed in Section 2. Using the taxonomy proposed by Bourguignon and Spadaro (2006), we can define this approach as a simple arithmetical microsimulation which does not capture any behavioural response of neither Italian workers nor firms. This means that we are not able to consider any variation in the children’s gross earnings distribution related to the effect of the fiscal reform on labour supply, demographic composition and other important labour market outcomes such as the wages or the employment rate.

Therefore, we are interested in analyzing a first-order effect of the fiscal reform on the

intergenerational transmission of advantages, leaving constant gross incomes recorded in the 2011 EU-SILC wave. In other terms, we simply modified individuals' net labour earning by applying to gross earnings the fiscal rules of the proposed dual income tax described in Section 2.

The estimated  $\beta_s$  and  $\gamma_s$  at the mean, obtained before or after applying the dual tax to children's gross earnings in Italy, are presented in Figure 6 . Since we are using

Figure 6: OLS estimates of the link between children's gross/net earnings and parental background in Italy before and after the fiscal reform



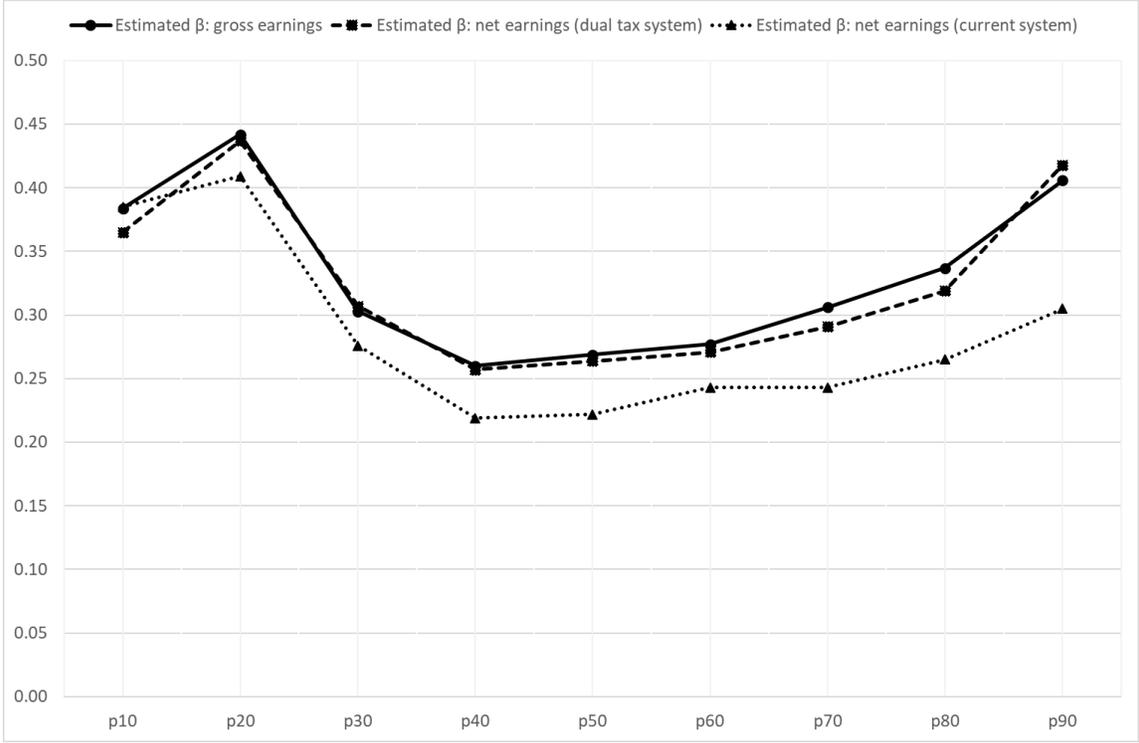
**Notes:** Reference category: children in the lowest tertile of the parental background distribution. Control variables included in the regressions but no showed are: a 2nd grade age polynomial and a dummy for sex. **Source:** Authors' elaborations on the 2011 EU-SILC wave.

an arithmetical microsimulation model, the estimated measures of background-related earnings advantages are equal to those presented in the previous sections when we focus on children's gross earnings. On the contrary, the degree of intergenerational transmission measured by the estimated  $\beta$  is higher in the dual tax case with respect to the 2010 fiscal system case when we consider net earnings. Interestingly, our measure

of the intergenerational link obtained using net earnings would become much higher in Italy than in Poland after applying the dual tax to Italian gross earnings.

Finally, when we estimate coefficients through the UQR to simulate the influence of the tax reform on the intergenerational link over the earnings' distribution, we find higher estimated  $\beta_s$  at any given percentile considered but the lowest (Figure 7).

Figure 7: UQR estimates of the link between children's gross/net earnings and parental background in Italy before and after the fiscal reform



**Notes:** Reference category: children in the lowest tertile of the parental background distribution. Control variables included in the regressions but no showed: a 2nd grade age polynomial and a dummy for sex. **Source:** Authors' elaborations on the 2011 EU-SILC wave.

The estimated increase in our measure of intergenerational link related to the reduction in tax progressivity is particularly strong at the top of the children's earnings distribution. For instance, looking at the at the 90th percentile of the children's earnings distribution, the estimated  $\beta$  does not change considering gross earnings or net earnings obtained by applying the proposed dual tax schedule. On the contrary, the lower estimated  $\beta$  in the lowest decile would be related to variations in the rules about tax deductions that are expected to slightly reduce current earnings inequality at the

bottom of the children’s earnings distribution.

## 6 Concluding remarks

Exploiting the 2011 wave of the EU-SILC, we carry out both OLS and UQR estimates of the link between either gross or net children earnings and parental characteristics. As expected, we find that the size of the intergenerational link is reduced by personal income taxes much more in Italy than in Poland due to existing differences in the degree of tax progressivity between the two countries.

The influence of personal income taxes on background-related rank advantages along the earnings distribution is very low in both two countries, as almost all of the taxation-related re-ranking is orthogonal to parental background. This result suggests that the link between the position in the earnings distribution and parental background can be better reduced by implementing policies able to correct the underlying mechanisms of the intergenerational transmission of advantages in the labor market rather than by exploiting taxation as a main way to implement this specific aspect of socioeconomic mobility.

When we compute alternative net earnings of Italian children, obtained after applying a slightly dual tax system to 2010 gross earnings, we obtain higher estimates of the intergenerational link. Hence, our results show that a fiscal reform aimed at reducing the number of tax brackets and rates – might have bad consequences in terms of both current inequality and intergenerational transmission of advantages by substantially reducing the amount of taxes paid by workers placed at the top of the earnings distribution.

However, in the long-run lower taxes are likely to have an effect also on labor supply, labor market outcomes and other socio-demographic factors. On the one hand, lower tax rates might have positive long-term effects on gross earnings of the poor and for those around the median earnings. On the other hand, lower taxes for the working rich could increase their gross earnings too, increasing inequality at the top. Therefore, future studies aimed at capturing the long-run influence of a fiscal reform on the intergenerational link should exploit complex behavioral dynamic microsimulation models able to simulate gross earnings variations as a response of newly introduced fiscal rules.

A final caveat is needed. In most empirical analyses regarding cross-country compar-

isons in intergenerational mobility, either gross or net earnings are considered without distinction, according to the type of data availability. However, as shown in this paper, the estimated intergenerational link is affected by the structure of personal income tax. Therefore, cross country comparisons should be carried out using a homogenous income definition, possibly gross incomes, when the intergenerational link deriving from market forces is the main focus, or net incomes when researchers aim at comparing individuals' economic wellbeing.

## References

- Barbieri, T., Bloise, F., and Raitano, M. (forthcoming). Intergenerational earnings inequality in Italy: New evidence and main mechanisms. *Review of Income and Wealth*.
- Black, S. E. and Devereux, P. J. (2011). *Recent Developments in Intergenerational Mobility*, volume 4 of *Handbook of Labor Economics*. Elsevier.
- Blanden, J. (2013). Cross-country rankings in intergenerational mobility: a comparison of approaches from economics and sociology. *Journal of Economic Surveys*, 27(1):38–73.
- Böhlmark, A. and Lindquist, M. J. (2006). Life-cycle variations in the association between current and lifetime income: replication and extension for sweden. *Journal of Labor Economics*, 24(4):879–896.
- Bourguignon, F. and Spadaro, A. (2006). Microsimulation as a tool for evaluating redistribution policies. *Journal of Economic Inequality*, 4(1):77–106.
- Corak, M. (2013). Income inequality, equality of opportunity, and intergenerational mobility. *Journal of Economic Perspectives*, 27(3):79–102.
- Firpo, S., Fortin, N. M., and Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica*, 77(3):953–973.
- Franzini, M. and Raitano, M. (2009). Persistence of inequality in europe: the role of family economic conditions. *International Review of Applied Economics*, 23(3):345–366.

- Granovetter, M. (1995). *Getting a job: a study of contacts and careers*. University of Chicago press.
- Haider, S. and Solon, G. (2006). Life-cycle variation in the association between current and lifetime earnings. *American Economic Review*, 96(4):1308–1320.
- Hampel, F. R. (1974). The influence curve and its role in robust estimation. *Journal of the american statistical association*, 69(346):383–393.
- Italian Tax Revenue Agency (2010). Italian Tax Revenue Agency Online Annual Report (Part III). Technical report.
- Landersø, R. and Heckman, J. J. (2017). The Scandinavian fantasy: the sources of intergenerational mobility in Denmark and the US. *Scandinavian journal of economics*, 119(1):178–230.
- Mocetti, S. (2007). Intergenerational earnings mobility in Italy. *BE Journal of Economic Analysis & Policy*, 7(2):1–25.
- OECD (2018). *A Broken social elevator? How to promote social mobility*. OECD Publishing, Paris.
- PFK (2010). PFK Poland Tax Guide. Technical report.
- Piraino, P. (2007). Comparable estimates of intergenerational income mobility in Italy. *BE Journal of Economic Analysis & Policy*, 7(2):1–27.
- Raitano, M., Vittori, C., and Vona, F. (2016). The effect of parental background along the sons’ earnings distribution: does one pattern fit for all? *Applied Economics Letters*, 23(15):1073–1078.
- Raitano, M. and Vona, F. (2015a). Direct and indirect influences of parental background on children’s earnings: a comparison across countries and genders. *The Manchester School*, 83(4):423–450.
- Raitano, M. and Vona, F. (2015b). Measuring the link between intergenerational occupational mobility and earnings: evidence from eight European countries. *Journal of Economic Inequality*, 13(1):83–102.