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Labor share as an "automatic stabilizer" of income inequality

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Abstract

We provide a new and unexplored explanation of the relationship between the functional and personal distribution of income. By proposing a simple theoretical framework, we show that, in the noncomprehensive personal income tax (PIT) hypothesis (i.e., when some or all capital income items are excluded from the PIT base), the correlation between disposable and market income inequality depends on the labor share level, which may influence the overall effectiveness of the tax-benefit system in addition to the PIT progressivity. We test our hypothesis using panel data on 33 OECD countries from 2000 to 2017 and find that a 10-pp increase in labor share is related to a 0.06 reduction in the correlation between market and disposable income inequality. This significant result obtained after controlling for country and year fixed effects, country-specific linear trends, and several confounders capturing the characteristics of the tax-benefit system suggests that labor share may act as an "automatic stabilizer" of market income inequality. Relevant implications for tax policy concern the role of the PIT's base for the public budget's overall redistributive effect.

Keywords Income inequality · Labor share · Income taxation · Redistribution

JEL Classification D31 · D33 · H24

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1 Introduction

In recent decades, many studies have documented a sizable increase in disposable income inequality in many high-income countries (Bourguignon, 2018; Morelli et al., 2015; OECD, 2011) as a possible consequence of a simultaneous increase in market income inequality (Bozio et al., 2020). Different mechanisms may explain a rise in market income inequality. Generally, market inequality increases for at least two factors, which may act simultaneously or not. First, market income concentration increases when either inequality within capital owners or labor earners increases or both. Second, among all other mechanisms behind the evolution of market income inequality, many contributions have focused on the importance of changes in the functional distribution of income, namely, the labor share of income (Bengtsson & Waldenström, 2018; Daudey & García-Peñalosa, 2007; Francese & Mulas-Granados, 2015; Glyn, 2009; Hoeller et al., 2012; Schlenker & Schmid, 2015).[1] Most empirical evidence on the relationship between personal and functional income inequality finds a significant negative correlation between labor share and personal inequality. For example, Daudey and García-Peñalosa (2007) and Checchi and García-Peñalosa (2010) show that a larger labor share is generally associated with lower income inequality. One common explanation is that market inequality among labor earners is lower than capital income inequality so that as the labor share declines, personal income inequality mechanically increases (Glyn, 2009; Milanovic, 2017; Schlenker & Schmid, 2015).[2]

This paper points out a complementary reason disposable income inequality may have increased over time due to increases in market income inequality. To the extent that nonlabor income is partially or fully excluded from the tax base of the personal (progressive) income tax, a lower labor share may be associated with a higher correlation between market and disposable income inequality and lower redistribution. Hence, by proposing a straightforward theoretical framework, we describe a new and unexplored channel that may explain the labor share-income inequality relationship in addition to the one analyzed in the literature. Specifically, a lower (higher) level of the labor share may be associated with a higher (lower) disposable income inequality not only by fostering an increase (a decrease) in market income inequality but also by reducing (improving) the ability of the tax system to work as a sort of "automatic stabilizer" of market income inequality.

Although various taxes and tax treatments may mitigate the link between market and disposable income inequality, the primary redistributive tool is the personal income tax (hereafter, PIT). The PIT reduces market income inequality through its progressive structure given by rising marginal tax rates applied to higher income

[1] Another important driver of market income inequality has been identified in the growing wealth inequality. Starting from the famous contribution by Piketty (2014), the relationship between income and wealth inequality has been deeply analyzed in recent economic literature (Garbinti et al., 2020; Lieberknecht & Vermeulen, 2022; Saez & Zucman, 2016).

[2] Notably, some contributions have found that the increasing income inequality is mainly related to the increase of inequality within labor income earners. See Hoeller et al. (2012) and Francese and Mulas-Granados (2015).

brackets, deductions, tax credits, preferential tax treatments of labor income, and allowances for labor expenses. Our theoretical framework shows that an additional relevant channel through which the PIT may reduce inequality deriving from market forces is related to the characteristics and width of its base (Baldini, 2021; Bises & Scialà, 2014; Figari & Paulus, 2015). When the PIT base perfectly matches the comprehensive income definition, i.e., the S–H–S (Schanz–Haig–Simons) definition of income, what determines the capacity of the PIT to react to higher market income inequality is that part of the PIT structure that affects the level of income.[3] In that case, no role is played by the composition of the tax base. The personal distribution of total income is the only factor to consider when analyzing the PIT's redistributive effect, while functional distribution is irrelevant. In contrast, in the more realistic hypothesis of a noncomprehensive PIT, where one or more of the items of capital income (e.g., interest, dividends, property income, capital gains) are excluded from the PIT tax base and taxed with a flat rate (or even not taxed at all), the labor share could play an essential role in determining the association between market and disposable income inequality.

We test the latter hypothesis on a balanced panel of 33 countries followed from 2000 to 2017, using information on market and disposable income inequality taken from the Standardized World Income Inequality Database (SWIID), detailed data on the characteristics of the tax-benefit system provided by the OECD tax database, and alternative measures of the labor share of income taken from the annual macroeconomic database of the European Commission (AMECO) and from the International Labour Organization Department of Statistics (ILOSTAT).

After controlling for country and year fixed effects, country-specific linear trends, and additional time-varying variables, which are likely to capture the structure and redistributive capacity of the tax-benefit system, we show that the correlation between disposable income inequality and market income inequality is significantly and negatively associated with the level of the labor share of income. Specifically, we find that a 10-pp increase in labor share is associated with a 0.06 reduction in the correlation between disposable and market income inequality. This relevant result, robust to many alternative specifications and empirical strategies, suggests that the labor share of income acts as an "automatic stabilizer" of income inequality.

In addition to contributing to the literature on the relationship between labor share and disposable income distribution, our analysis is also related to the literature on the effectiveness of redistribution in mitigating the direct link between market and disposable inequality. Many contributions have tried to determine which kind of fiscal instruments can be more effective in reducing the concentration of market income (Akgun et al., 2017; Atkinson, 2000; Bargain et al., 2015; Caminada et al., 2017; Causa & Hermansen, 2018; D'Agostino et al., 2020; Doorley et al., 2021; Duncan & Sabirianova Peter, 2016). Our results show that the overall effectiveness

[3] Comprehensive income is defined as "the value of what" an individual "could have consumed during the year without … diminishing his capital wealth in the process". It constitutes "a true measure of the total economic opportunity accruing to him in the year in question" (Meade 1978, p. 31). See Schanz (1896), Haig (1921), and Simons (1938) for the seminal definition of comprehensive income.

of the redistributive policy is also significantly related to the functional distribution of income in the noncomprehensive PIT hypothesis.

Finally, this paper is indirectly related to the literature on the effects of globalization on taxation and the labor share of income. For example, Egger et al. (2019) and Bachas et al. (2022) document a negative relationship between globalization and the progressivity of taxation. To the extent that globalization is associated with changes in the functional distribution of income (Grossman & Oberfield, 2022; Young & Tackett, 2018), our results are consistent with the findings of this literature.

Two alternative policy implications stem from our analysis. First, in high-labor share countries, an increase in the overall progressivity of the tax-benefit system could be considered an effective policy to mitigate market income inequality, even if the PIT base is not fully comprehensive. In contrast, as labor share falls, policies intended to extend the comprehensiveness of the PIT base become increasingly influential in reducing the correlation between market and disposable income inequality than modifications of the PIT progressivity.

The paper is structured as follows. Section 2 describes the theoretical reasons the functional distribution of income can influence the link between market and disposable income inequality. Section 3 presents our empirical strategy. Section 4 describes the main features of our dataset. Section 5 shows the main results of our econometric analysis. Section 6 provides some sensitivity tests to verify the stability of our results, and Sect. 7 concludes.

2 Theoretical insight

2.1 General framework

To provide some theoretical insight into the relationship between the personal and the functional distribution of income, consider the following equation describing the link between the personal income inequality of disposable income and the personal income inequality of market income:

$$G_d = b \cdot t \cdot G_m, \tag{1}$$

where G_m is the Gini coefficient computed on market income distribution, G_d is the Gini coefficient computed on disposable income distribution, and b and t are parameters that quantify the ability of the benefit (b) and tax (t) system to reduce personal income inequality when moving from market income to disposable income: the higher $b \cdot t$, the lower the ability of the tax-benefit system to reduce income inequality. In the extreme case of $b \cdot t = 1$, we obtain $G_d = G_m$, and then the tax-benefit system is perfectly proportional, i.e., it has no redistributive effect. The antipodean case of $b \cdot t = 0$ implies that $G_d = 0$, regardless of the value of G_m; that is, public policies can offset any market inequality fully. In general, in an overall progressive system, we can assume $0 \leq b \cdot t < 1$ since market income inequality is reduced through the tax-benefit system.

To introduce the role of the functional distribution of income into the analysis, let us make use of Shorrocks' (1982) "natural" decomposition of personal income inequality:

$$G_m = s_l \cdot \overline{G}_l + s_k \cdot \overline{G}_k = s_l \cdot \overline{G}_l + \left(1 - s_l\right) \cdot \overline{G}_k, \tag{2}$$

where s_l is the labor share, $s_k = 1 - s_l$ is the share of nonlabor income, and $\overline{G}_l$ and $\overline{G}_k$ are the pseudo-Gini on labor and nonlabor income, respectively.

From Eq. (2), we can derive the effect of a change in labor share on market income inequality. If we assume that pseudo-Gini coefficients are not affected by the labor share, we have:

$$\frac{dG_m}{ds_l} = \overline{G}_l - \overline{G}_k. \tag{3}$$

Notice that the sign of Eq. (3) depends on the comparison between the inequality within labor income earners and the inequality of nonlabor income earners: a decrease in labor share implies an increase in market income inequality if and only if the distribution of nonlabor income is relatively more uneven than the distribution of labor income.

Since it is widely documented that the distribution of nonlabor income is more concentrated than the distribution of labor income (OECD, 2011), hereafter, we will assume that $\overline{G}_l < \overline{G}_k$.

2.2 The case of the comprehensive personal income tax base

In tax-benefit systems based on a comprehensive definition of taxable personal income—, i.e., all income items, whether from labor or capital, are included in the PIT base and then subject, for any individual, to the same tax structure—the effects of fiscal policy on income inequality can be described as follows:

$$G_d = b \cdot t \cdot \left[s_l \cdot \overline{G}_l + \left(1 - s_l\right) \cdot \overline{G}_k\right]. \tag{4}$$

From Eq. (1), it is possible to assess the effect of a change in market income inequality on disposable income inequality, that is:

$$\frac{dG_d}{dG_m} = b \cdot t. \tag{5}$$

Equation (5) shows that if b and t are assumed to be exogenous parameters, the size of the dampening of market income inequality is independent of the labor share. That is, the redistributive power of the tax-benefit system is independent of the dynamics of the labor share and, therefore, of the functional distribution of income.

Comprehensive PIT base hypothesis. *In the case of a comprehensive definition of the PIT base, a change in the labor share does not affect the relationship between market income inequality and disposable income inequality.*

2.3 The case of the personal income tax base excluding all nonlabor income

Let us now analyze the case in which the tax system is based on a definition of income that deviates from the comprehensive one. In that case, all nonlabor income is excluded from the progressivity of the PIT. In contrast, the benefit system is supposed to consider individual income as a whole and not discriminate between capital income and labor income earners.[4] Under this scenario, Eq. (4) turns out to take the following expression:

$$G_d = b \cdot \left[t \cdot s_l \cdot \overline{G}_l + \left(1 - s_l\right) \cdot \overline{G}_k \right] = \theta \cdot G_m, \tag{6}$$

where:

$$\theta = \frac{b \cdot \left[s_l \cdot t \cdot \overline{G}_l + \left(1 - s_l\right) \cdot \overline{G}_k \right]}{s_l \cdot \overline{G}_l + \left(1 - s_l\right) \cdot \overline{G}_k}. \tag{7}$$

According to Eq. (6), while the whole tax-benefit system deploys its redistributive effects on labor income inequality, only the benefit system can reduce that part of income inequality related to the distribution of nonlabor income. Therefore, the parameter θ represents a measure of the redistributive effect of the public budget as a whole in the case of the interplay of the two public budget tools (the larger θ, the smaller the overall effect).

The effect on disposable income inequality of a change in market income inequality is now given by:

$$\frac{dG_d}{dG_m} = \theta. \tag{8}$$

Since θ depends on the labor share, the latter now affects the effect of a change in market income inequality on disposable income inequality.

Therefore, let us focus on the effect of a change in the labor share on the redistributive power of the tax-benefit system in the fiscal setting, described by the first term in (8). It is informative to assess what happens in the two extreme cases in which $s_l = 0$ and $s_l = 1$. If $s_l = 0$, we obtain the case in which, because of the exclusion of nonlabor income from the PIT base, the tax system does not redistribute at all, i.e., $\theta = b$. When $s_l = 1$, we obtain the same redistributive result that we would obtain under a tax-benefit system based on a comprehensive definition of taxable income, i.e., $\theta = b \cdot t$. Finally, in the case of $0 < s_l < 1$, $b \cdot t < \theta < b$. In general,

[4] It should be noted, however, that if some benefits (in cash or in-kind) are provided based on the individual income situation resulting from the PIT return – without adjusting the latter for the capital income items excluded from the PIT base – a noncomprehensive PIT base also affects the degree of progressivity of the expenditure side of the public budget. Since in our empirical analysis disposable income is the result of income earned after taxes and in-cash benefits only, the above effect would be limited to the latter component.

the impact of a change in labor share on the capacity of the tax-benefit system to dampen increases in market inequality is now given by:

$$\frac{dG_d}{dG_m ds_l} = \frac{d\theta}{ds_l} = \frac{b \cdot G_m \cdot \left(t \cdot \overline{G}_l - \overline{G}_k\right) - G_d\left(\overline{G}_l - \overline{G}_k\right)}{G_m^2}. \tag{9}$$

with $\overline{G}_l < \overline{G}_k$, we have that, under mild assumptions, $d\theta/ds_l < 0$.[5]

Noncomprehensive PIT base hypothesis. *In the case of a noncomprehensive definition of the PIT base—specifically excluding all income from capital—the relationship between market income inequality and disposable income inequality is negatively related to the labor share.*

In other words, the capacity of a given structure of the tax-benefit system to reduce income inequality is now affected by the functional distribution of income.

3 Econometric analysis

This section presents the empirical strategy adopted to verify which one of the two hypotheses on the effect of labor share on the link between market income inequality and disposable income inequality presented in Sect. 2 is confirmed.

According to our theoretical framework described in Sect. 2, θ captures the correlation between disposable and market income inequality. Symmetrically, $1 - \theta$ is a measure of the overall redistributive capacity of the tax-benefit system. Specifically, in the unrealistic hypothesis of no redistribution, we should have that $\theta = 1$. In contrast, if the overall amount of market income inequality is reduced due to the role of the tax-benefit system, we should have that $\theta = 0$. In the more realistic case in which market income inequality is only partially reduced by the redistributive effect of the fiscal system, we have that $0 < \theta < 1$.

Parameters b and t, which capture the redistributive effect of benefits and taxes, respectively, are assumed to be uncorrelated to the labor share of income in Sect. 2. However, from an econometric point of view, it is necessary to relax the assumption that the labor share of income is uncorrelated to the overall degree of progressivity of the tax-benefit system. Such an assumption would imply that we could estimate the influence of labor share on the link between market and disposable income inequality by simply estimating a linear regression model as follows:

$$Ginidisp_{it} = \alpha + \ \theta \ Ginimark_{it} + \rho LS_{it} + \gamma\left(LS_{it} * Ginimark_{it}\right) + e_{it}. \tag{10}$$

[5] It can be shown that (see "Appendix 1") a sufficient condition for $d\theta/ds_l < 0$ is that $b \cdot G_m > G_d$. The violation of the latter condition implies that the benefit system alone is more redistributive than the entire tax-benefit system; this could happen if the tax system were so regressive to overcompensate the redistribution operated by the benefit system, in fact, a very peculiar case.

where $Ginidisp_{it}$ is the Gini calculated on disposable income for country i at time t, $Ginimark_{it}$ is the corresponding Gini computed on market income, and LS_{it} is the labor share of income.

The parameter θ in Eq. (10) captures the correlation between market and disposable income inequality. In contrast, ρ captures the correlation between disposable income inequality and labor share in the unrealistic hypothesis of market income inequality equal to zero. Finally, by including the interaction term between the labor share of income and the Gini on market income inequality, our parameter of interest γ would capture the effect of labor share on the link between disposable and market income inequality. That is, the strength of the link between market and disposable income inequality can change according to the level of labor share described in the theoretical framework proposed in Sect. 2.

Since we need to relax the previously mentioned exogeneity assumption by controlling for those characteristics of the tax-benefit system in the error term e_{it} of Eq. (10) that affect redistribution and are correlated to both labor share and disposable income inequality, we estimate whether the link between disposable and market income inequality changes according to the level of the labor share by using the following econometric specification:

$$\begin{aligned} Ginidisp_{it} = \alpha + \ \theta\ Ginimark_{it} + \rho LS_{it} + \gamma\left(LS_{it} * Ginimark_{it}\right) \\ + \beta Rel_{it-1} + \omega X_{it} + c_i + \tau_t + c_i * year + \varepsilon_{it}. \end{aligned} \tag{11}$$

To control for potential endogeneity deriving from differences in the redistributive capacity of taxes and benefits, we consider lagged relative redistribution Rel_{it-1} (i.e., the ratio between disposable and market income inequality measured at time t − 1) and the vector of detailed tax-benefit characteristics X_{it}. The latter includes the Kakwani index of progressivity for personal taxation, the overall amount of social expenditure and the amount of tax revenues as a share of GDP, the share of total revenues from taxes on property, the share of revenues from indirect taxes, the amount of contributions as a percentage of total revenues, the tax wedge calculated at mean income, and the log GDP per capita. We further control for potential additional characteristics of the tax-benefit system that are not captured by Rel_{it-1} and X_{it} by including c_i, τ_t, and $c_i * year$, which represent country fixed effects, year fixed effects, and country-specific linear trends, respectively.

According to the theoretical framework in Sect. 2, we expect the parameter γ to be either negative (in the noncomprehensive tax base hypothesis) or not significantly different from zero (in the comprehensive tax case).

4 Data and descriptive evidence

We estimate Eq. 11 using detailed information from different sources. To maximize the degree of comparability across countries and over time and the number of observations on market and disposable income inequality indices, we take information on Gini coefficients from the 9.4 version of the SWIID released in November 2022 (Solt, 2020). The SWIID is the most comprehensive dataset on market and

disposable income inequality. It provides standardized inequality indices taken from different sources (e.g., OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean generated by CEDLAS and the World Bank, Eurostat, the World Bank's PovcalNet, the U.N. Economic Commission for Latin America and the Caribbean, national statistical offices around the world, and academic studies). It has been widely used in empirical research on income inequality in recent years (see, for example, Berg et al., 2018; Darvas, 2019; De Haan & Sturm, 2017; Filippin & Nunziata, 2019; Jaumotte & Osorio Buitron, 2020; Kotschy & Sunde, 2017; Matsubayashi & Sakaiya, 2021).

Although the SWIID has sometimes been criticized in the past because of the multiple imputation procedures adopted to increase the number of countries covered and manage the trade-off between comparability and data coverage (Jenkins, 2015), using inequality measures taken from the Luxembourg Income Study (LIS) as the high-quality benchmark, Solt (2020) shows that in the revised versions of the SWIID, the imputation procedures adopted do not prevent the SWIID from predicting income inequality indices reported in the LIS database.[6]

Notably, the SWIID incorporates uncertainty derived from multiple-imputation methods by providing a distribution of 100 Gini coefficients for each country-year pair. As is standard in the literature, we incorporate uncertainty introduced by multiple-imputation procedures by simply averaging the 100 inequality indices of disposable and market income inequality for each country-year combination.

Regarding data on the labor share of income, we take information provided by AMECO. In our baseline analysis, we define the labor share of income as the compensation of employees as a percentage of GDP at factor cost. Additionally, alternative definitions of labor share are adopted to test the sensitivity of our results. Specifically, in further sensitivity tests, we define labor share as the compensation of employees as a percentage of GDP at market prices or as the adjusted labor share taken from ILOSTAT, which also incorporates the labor part of self-employment income.

All other information on the characteristics of the fiscal systems is taken from the OECD revenue statistics database, which provides a rich set of information on tax rates, tax brackets and many other features of the tax-benefit system from 2000 onward. As a baseline measure of the overall progressivity of the PIT, we compute the Kakwani index of progressivity following the procedure adopted by Gerber et al. (2020). Specifically, for each country-year pair, we use information on tax rates and tax brackets provided by the OECD Taxing Wage annual publications to compute the Kakwani index of progressivity, using an independent before-tax income distribution calculated over a fixed range of incomes (i.e., 0–500% of per capita GDP). This procedure allows us to consider a measure of progressivity of PIT that is exogenous with respect to the actual before-tax distribution of income and highly informative on the potential redistributive power of PIT, independent of changes in inequality occurring in labor and capital markets.

[6] See Solt (2015) for a detailed answer to Jenkins' criticism.

To test the sensitivity of our baseline results to our measure of PIT progressivity, we provide an additional estimate in which we control for three alternative measures of progressivity of PIT computed along the distribution (the top tax rate, the difference between tax rates at 167% and 100% of the individual average wage, and the difference between tax rates at 100% and 67% of the individual average wage).

The other variables that capture the characteristics of the tax-benefit system included in our econometric specifications are the total amount of social expenditure as a percentage of GDP, the amount of tax revenues as a percentage of GDP, the percentage of revenues from property taxes, the percentage of revenues from indirect taxes, the tax wedge calculated at 100% of average labor income and the amount of contributions as a share of total revenues.

Using inequality measures taken from the SWIID dataset and all other variables from the publicly available OECD tax database and AMECO, we can obtain a balanced panel including 33 OECD countries from 2000 to 2017.[7]

As mentioned in the previous sections, the association between the functional and personal distribution of income has been widely analyzed in many of the abovementioned empirical works. Figure 1 confirms that labor share and income inequality are negatively associated, with an estimated coefficient of − 0.297.[8] However, this kind of descriptive evidence, even if helpful for confirming that the functional and personal distribution of income are negatively correlated, does not give us any information on the possible influence of the labor share on the link between market and disposable income inequality and thus on the effectiveness of the tax-benefit system to redistribute.

Figure 2 shows that, as expected, market and disposable income inequality are positively related in the considered period. However, when we divide countries into two subgroups by labor share level (i.e., below or above the median labor share), we find that the association between market and disposable income inequality is higher when considering low-labor share countries than when considering countries above the median labor share. Specifically, the regression coefficient of Gini on disposable income on Gini on market income is 0.653 (0.467) in the low-labor share (high-labor share) group of countries. This result suggests that, on average, for a 10-pp increase in market inequality, disposable income inequality is 6.53 (4.67)-pp higher in the low- (high-) labor share group of countries. Although Fig. 2 provides only descriptive evidence, it suggests that labor share could play a role in mitigating the link between market and disposable income

[7] The countries included in our sample are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. Our time dimension is limited given that the OCED tax database does not provide information on the tax-benefit systems before 2000 and after 2017 are missing for Australia and Japan. Eventually, information on labor share for Korea are not available in the Ameco database from 2000 to 2003.

[8] Note that the regression lines and coefficients presented in Figs. 1 and 2 are obtained by considering all observations in our panel of countries. In contrast, due to graphical reasons, markers are obtained by considering, for each country, the average Gini on Disposable income, Gini on market income and the labor share in the considered period.

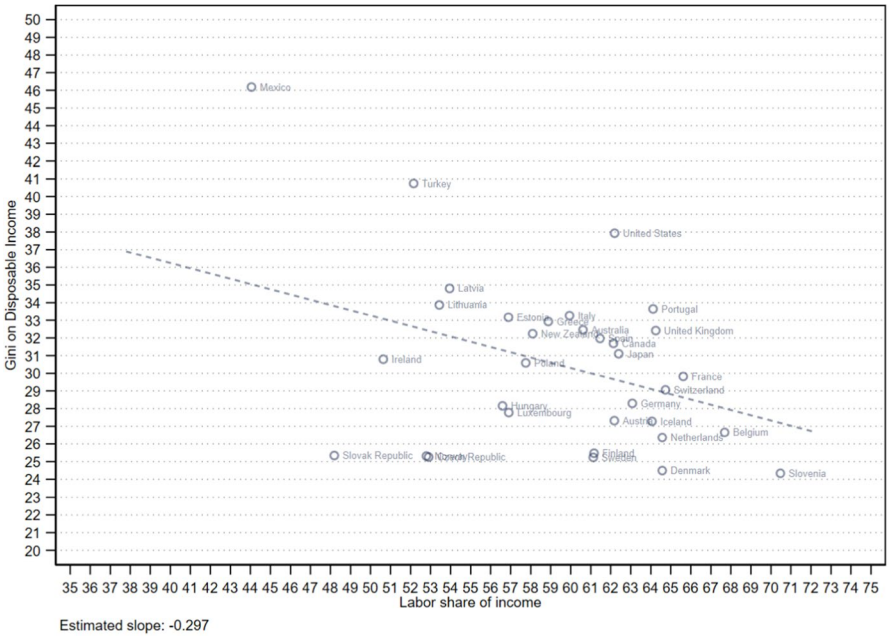

Fig. 1 Estimated association between Gini on disposable income and the labor share of income. Source: SWIID 9.4 and Ameco

inequality due to the mechanisms deriving from the noncomprehensiveness of personal income taxes described in Sect. 2. Notably, most countries in our sample have experienced relevant increases in labor share in the period considered (see Fig. 3).

Table 1 presents the median and the standard deviation of all variables used in our empirical analysis. The Gini coefficient of disposable income inequality, our outcome variable in all econometric specifications, is 30.18 at the median, while the corresponding parameter on market income inequality is 17.78 percentage points higher.

When considering the median labor share of income at factor prices, we have a value of 60.40 in our sample, while the standard deviation is 6.27. Finally, concerning the tax-benefit control variables, it is worth mentioning that the median Kakwani index and its dispersion are very close to the ones calculated by Gerber et al. (2020) on a different sample of OECD countries.

5 Estimation results

This section presents the results obtained from our regression model. As already mentioned in the previous sections, when $0 < \theta < 1$, a fraction of market income inequality is redistributed thanks to progressive taxes and benefits, while an estimated $\theta = 1$ means that no additional factors related to the redistributive capacity

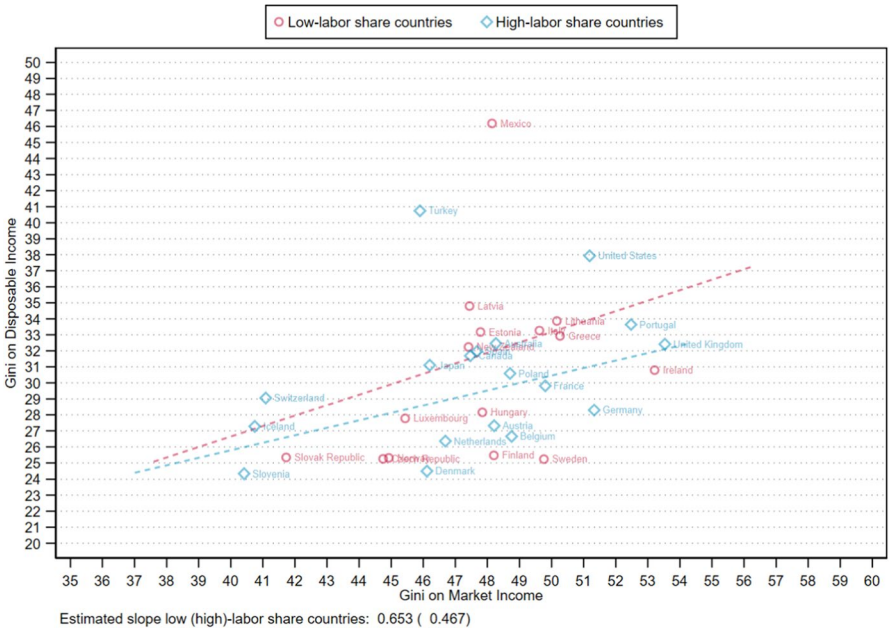

Fig. 2 Estimated association between market inequality and disposable inequality according to different levels of labor share. Source: SWIID 9.4

of the fiscal system influence the estimated difference between market and disposable income inequality. Table 2 shows the estimated parameters θ, ρ, and γ, our main parameter of interest, which gives us information on the extent to which the labor share of income might influence the correlation between market and disposable income inequality. We estimate different models with or without considering the vector of tax-benefit controls. In Model 1, we control for relative redistribution at time t − 1, country fixed effects, year fixed effects, and country-specific linear trends. In Model 2 (our baseline), we further control for the tax-benefit variables in the vector X_{it} of Eq. (11). Finally, to test the sensitivity of our baseline results to our baseline measure of PIT progressivity (i.e., the Kakwani index), we provide an additional estimate (Model 3) in which we control for three alternative measures of progressivity of PIT computed along the distribution: the top tax rate, the difference between tax rates at 167% and 100% of the individual average wage, and the difference between tax rates at 100% and 67% of the individual average wage.

When no tax-benefit control variables are considered in the regression (Table 2, Model 1), the estimated γ is − 0.007 and significantly different from zero at the 1% significance level when considering standard errors clustered at the country level. That is, a 10-pp increase in labor share reduces the correlation between the Gini on disposable income and the Gini on market income by 0.07. However, given the

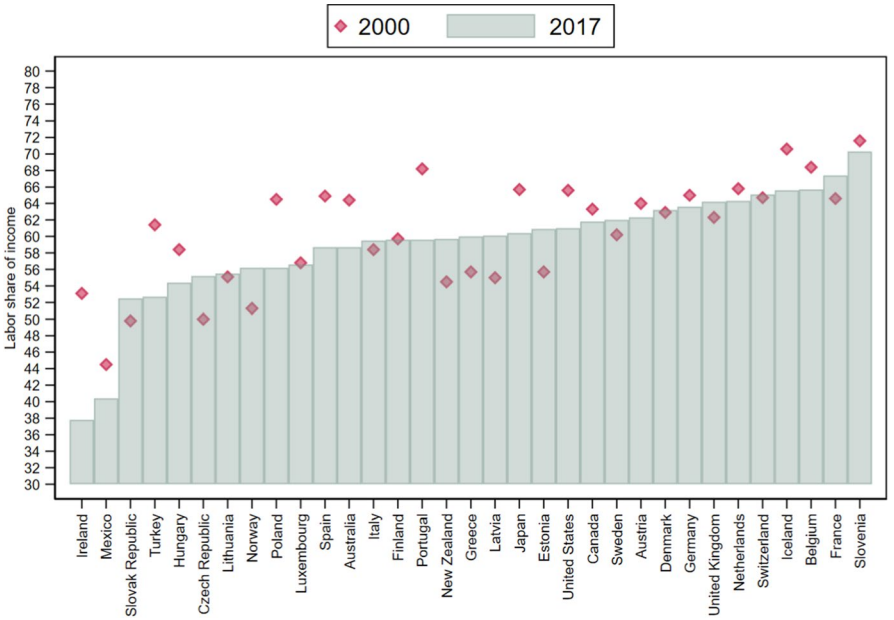

Fig. 3 Changes in labor share between 2000 and 2017. Source: SWIID 9.4

Table 1 Descriptive statistics

	Median	S.D
Inequality measures		
Gini of disposable income	30.18	4.90
Gini of market income	47.96	3.55
Labor share of income	60.40	6.27
Fiscal variables		
Kakwani index of progressivity	0.07	0.03
Social expenditure (% GDP)	21.52	5.46
Revenues from indirect taxes (% of total revenues)	31.97	7.03
Revenues from property taxes (% of total revenues)	4.22	3.55
Tax revenues (% GDP)	29.33	11.95
Tax wedge at mean income	31.38	13.40
Social Contributions (% of total revenues)	38.96	9.07
Additional control variables		
GDP per capita	10.39	0.46
Countries	33	33
Observations	594	594

Source: SWIID 9.4, Ameco, and OECD tax database

limited number of clusters, we also implement the wild cluster bootstrap method provided by Roodman et al. (2019), imposing the null and reporting the p-values

from that bootstrap. In the latter case, the estimated γ is significantly different from zero at the 10% significance level. When tax-benefit controls are included in our estimation (Table 2, Model 2, and Model 3), the estimated γ is -0.06 and statistically significant at the 5% level in the wild cluster bootstrap case.[9]

According to the theoretical framework proposed in Sect. 2, this result suggests that the noncomprehensive tax base hypothesis is strongly confirmed in our sample. Therefore, as the link between market and disposable income inequality (i.e., the parameter θ) is estimated to be lower as the labor share of income increases, we can refer to the labor share as an "automatic stabilizer" of income inequality. Therefore, our result suggests that besides its possible association with market income inequality, labor share might influence personal income inequality according to additional theoretical channels related to the redistributive capacity of the fiscal system.[10]

To improve the interpretability of our results, Fig. 4 provides marginal effects for our baseline model. By considering marginal effects, we assess the extent to which the correlation between market and disposable income inequality (i.e., the parameter θ, which indirectly captures the amount of redistribution) changes for a given combination of tax-benefit characteristics as the labor share of income increases. Figure 4 shows that in countries with different levels of labor share and the same tax-benefit characteristics, the effectiveness of redistribution is very different. For instance, when labor share is 80%, on average, 50% of overall market inequality is reduced due to the progressivity of the tax-benefit system. When labor share equals 30%, only 20% of market inequality is reduced once moving to disposable income. By considering that in our sample labor share has a minimum value of approximately 38% and a maximum value of approximately 72%, our result shows that a non-negligible amount of variation in the redistributive effectiveness of the tax-benefit system might be related to different levels of labor share rather than to differences in the potential progressivity of the PIT.

Back-of-the-envelope calculations provide approximate evidence of the increase in disposable inequality related to a corresponding increase in the correlation between market and disposable income inequality due to a reduction in labor share. Considering the average reduction in the labor share of 1.36-pp recorded in our sample of countries in the period considered, we calculate that approximately 5.3% of the overall increase in disposable inequality may be related to the new mechanism described in Sect. 2.

[9] We also implement the wild-bootstrap procedure as a robustness check with country and year-level clusters. In the latter case, we obtain a p-value of 0.042 for our baseline specification (Model 2).

[10] Note that the coefficient of labor share is positive and significantly different from zero. Hence, the intercept of the regression of Gini on disposable income on Gini on market income is higher as labor share increases (i.e., in the extreme hypothesis of market inequality equal to zero, an increase in labor share would be associated with an increase in disposable inequality).

Table 2 Estimates of the link between disposable income inequality and market income inequality

	Model 1	Model 2	Model 3
Ginimark*LS ($\widehat{\gamma}$)	− 0.007	− 0.006	− 0.006
	(0.002)***	(0.002)***	(0.002)***
	[0.079]*	[0.037]**	[0.038]**
Ginimark ($\widehat{\theta}$)	1.021	1.002	0.987
	(0.126)***	(0.114)***	(0.116)***
	[0.001]***	[0.000]***	[0.000]***
LS	0.325	0.299	0.288
	(0.087)***	(0.085)***	(0.086)***
	[0.077]*	[0.035]**	[0.036]**
Relative redistribution (t − 1)	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country-specific linear trends	Yes	Yes	Yes
Baseline tax-benefit controls	No	Yes	No
Modified tax-benefit controls	No	No	Yes
Obs	561	561	561

Source: Authors' elaborations. Standard errors clustered at the country level in parentheses. P-values calculated using the wild-bootstrap method with country clusters in brackets. ***$p<0.01$; **$p<0.05$; *$p<0.10$

6 Sensitivity tests

This section presents three sensitivity tests. In the first one, we test the sensitivity of our baseline result obtained from Eq. (11) to the definition of the labor share of income (Table 3 in "Appendix 2"). As a first alternative definition, we use the compensation of employees as a percentage of GDP at market prices rather than at factor prices. In the second, we take the adjusted labor share provided by ILOSTAT, which also incorporates the labor part of self-employment income. In both cases, the size of the estimated γ is highly comparable to the one obtained in the baseline specification. It is noteworthy, however, that the significance level is slightly lower when we use the adjusted labor share provided by ILOSTAT.

In the second sensitivity analysis, we evaluate the extent to which our main result is driven by one specific country in our dataset. Reassuringly, Fig. 5 in "Appendix 2" shows that the estimated γ is significantly different from zero and highly comparable in size with respect to the baseline result in each estimate, which iteratively excludes one single country in our sample at a time.

Finally, in the last sensitivity analysis presented in Table 4 of "Appendix 2", we iteratively include one single tax-benefit control variable to account for potential multicollinearity among regressors. The results show that the size of the estimated coefficient for the interaction term is exceptionally stable across specifications.

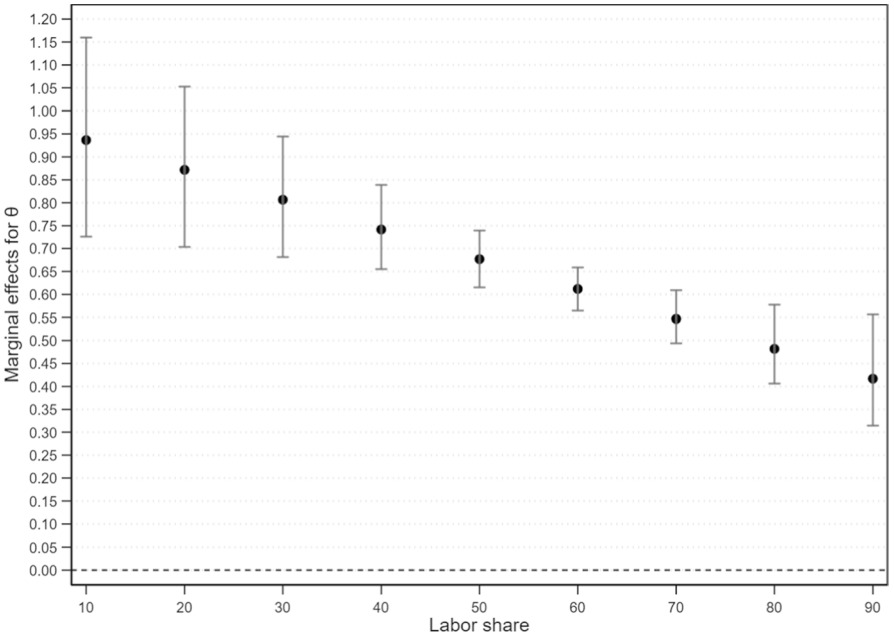

Fig. 4 Estimated marginal effects of the link between market and disposable income inequality. Source: Authors' elaborations. Notes: 90% confidence intervals of marginal effects are obtained using the wild-bootstrap method with country clusters

7 Concluding remarks

This paper provides new evidence on the association between functional and personal income distribution. Apart from the possible negative association between labor share and market income inequality documented by many earlier research works, labor share can also play a role in mitigating the connection between market and disposable income inequality. This role is related to the comprehensiveness of the PIT base. Specifically, we assumed that in the noncomprehensive tax base hypothesis, i.e., when one or more items of capital income are excluded from the tax base of the PIT, tax progressivity reduces that part of inequality that characterizes the labor market. However, it is far less able to mitigate capital income inequality. Therefore, as the labor share declines, the tax-benefit system becomes less effective in reducing overall market inequality.

Using data on a balanced panel of 33 OECD countries followed between 2000 and 2017, we show that, in line with the noncomprehensive tax hypothesis, a 10-pp increase in labor share reduces the correlation between disposable income inequality and market income inequality by 0.06. This finding, which is robust to the inclusion of country and year fixed effects, country-specific linear trends and many other controls related to the tax-benefit system in the econometric specifications, suggests

that the labor share of income acts as an "automatic stabilizer" of changes in market income inequality when the PIT base is noncomprehensive.

The above results point out that, given the PIT structure (e.g., tax rates, tax credits), the definition of the tax base per se may act as a progressivity factor.

Our results suggest two possible strategies to mitigate the overall incidence of market income inequality on disposable income inequality. The first strategy is adopting predistributive policies to mitigate the gap between rich and poor workers, among capital owners, or between capital owners and employees (Bozio et al., 2020). A second possible strategy is reducing the link between market and disposable income inequality. In this respect, the suggested solution is increasing the overall degree of progressivity of the tax system. However, as labor share falls, a predetermined degree of progressivity of personal income taxes might be less effective in reducing market income inequality. Therefore, adopting a more comprehensive PIT base could be an increasingly required tool to reduce the link between market and disposable income inequality.

As a final remark, the results obtained here have clear relevance for tax policy in itself, as they testify to the role of the definition and implementation of the tax base of the personal income tax—in the sense of the inclusion of all capital incomes—for the overall redistributive effect of that tax (and of the public budget as a whole), beyond the degree of progressivity of its structure given by tax rates, tax credits, and allowances.

Appendix 1: Detailed theoretical framework

Under the assumption that $\overline{G}_l < \overline{G}_k$ and reminding that $t \leq 1$, we have:

$$\left(\overline{G}_l - \overline{G}_k\right) < 0 \cdot \left(t \cdot \overline{G}_l - \overline{G}_k\right) < 0$$

Moreover,

$$\left|t \cdot \overline{G}_l - \overline{G}_k\right| > \left|\overline{G}_l - \overline{G}_k\right| \tag{12}$$

Equation (9) will be negative if the following condition is satisfied:

$$b \cdot \left|t \cdot \overline{G}_l - \overline{G}_k\right| > \frac{G_d}{G_m} \cdot \left|t \cdot \overline{G}_l - \overline{G}_k\right| \tag{13}$$

Given (12), a sufficient condition for (13) is that:

$$b > \frac{G_d}{G_m} \cdot b \cdot G_m > G_d$$

Appendix 2: Additional results

See Tables 3, 4 and Fig. 5.

Table 3 Sensitivity analysis: alternative definitions of labor share

	Baseline	Robustness 1	Robustness 2
Ginimark*LS ($\widehat{\gamma}$)	− 0.006	− 0.008	− 0.006
	(0.002)***	(0.002)***	(0.002)***
	[0.050]**	[0.034]**	[0.050]**
Ginimark ($\widehat{\theta}$)	0.986	1.016	0.986
	(0.117)***	(0.127)***	(0.117)***
	[0.000]***	[0.000]***	[0.000]***
LS	0.300	0.354	0.300
	(0.095)***	(0.109)***	(0.095)***
	[0.051]*	[0.032]**	[0.051]*
Relative redistribution (t − 1)	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country-specific linear trends	Yes	Yes	Yes
Baseline tax-benefit controls	Yes	Yes	No
Obs	561	561	561

Source: Authors' elaborations. Standard errors clustered at the country level in parentheses. P-values calculated using the wild-bootstrap method with country clusters in brackets. ***$p<0.01$; **$p<0.05$; *$p<0.10$

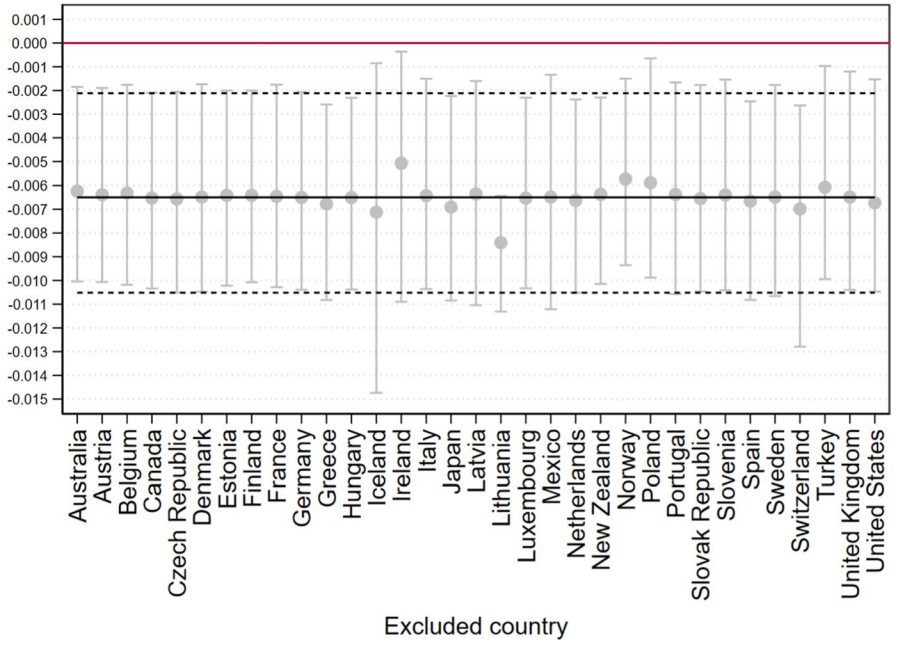

Fig. 5 Sensitivity analysis: country-specific effect. Source: Authors' elaborations. The horizontal solid line indicates the baseline estimated γ from Eq. (10), while the horizontal dashed lines indicate the corresponding 90% confidence intervals. The dots identify all 33 estimated coefficients obtained by excluding one country each time from our sample. The vertical lines show the 90% confidence intervals for each estimated θ

Table 4 Sensitivity analysis: accounting for potential multicollinearity among tax-benefit control variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ginimark*LS ($\widehat{\gamma}$)	− 0.006	− 0.007	− 0.007	− 0.007	− 0.007	− 0.007	− 0.007
	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.002)***
	[0.085]*	[0.068]*	[0.060]*	[0.078]*	[0.084]*	[0.078]*	[0.067]*
Ginimark ($\widehat{\theta}$)	0.986	1.033	1.005	1.020	1.022	1.024	1.020
	(0.124)***	(0.122)***	(0.129)***	(0.126)***	(0.128)***	(0.126)***	(0.121)***
	[0.001]***	[0.001]***	[0.000]***	[0.001]***	[0.001]***	[0.001]***	[0.001]***
LS	0.294	0.332	0.307	0.324	0.325	0.325	0.326
	(0.087)***	(0.084)***	(0.092)***	(0.087)***	(0.088)***	(0.087)***	(0.084)***
	[0.079]*	[0.066]*	[0.053]*	[0.077]*	[0.081]*	[0.079]*	[0.065]*
Relative redistribution (t − 1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country− specific linear trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	561	561	561	561	561	561	561

Source: Authors' elaborations. Notes: Standard errors clustered at the country level in parentheses. P-values calculated using a wild-bootstrap procedure in brackets. Tax-benefit control considered: social expenditure as a percentage of Gdp (column 1); revenues from indirect taxation as a percentage of Gdp (column 2), tax revenues as a percentage of Gdp (column 3); revenues from property taxation as a percentage of Gdp (column 4); tax wedge (column 5); Kakwani index of progressivity (column 6); contributions as a share of total revenues (column 7). ***$p<0.01$; **$p<0.05$; *$p<0.10$

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