Inequality and Public Policy

Michele Battisti

University of Palermo, LUISS and RCEA*

Joseph Zeira

Hebrew University of Jerusalem, CEPR and RCEA♣

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Abstract

This paper shows that public policies have a significant and large effect on inequality. One influence is through redistribution, as public expenditures affect the distribution of disposable income through progressive direct taxation and through social benefits. We measure this effect, identify it by use of instrumental variables and find that it is quite large. We then find that public policy affects the distribution of market incomes as well, through public education, hiring to the public sector, building infrastructure and through labor market regulation. We measure all the effects directly and by use of instrumental variables as well.

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* E-mail: michele.battisti75@gmail.com.

♣ E-mail: joseph.zeira@mail.huji.ac.il.

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1. Introduction

In recent decades, income distribution has become an important macroeconomic variable. Economists examine how the distribution of income affects other macroeconomic issues, like economic growth and business cycles. They also study what determines the distribution of income and why it differs so much both across countries and over time. There are many reasons for the rise in interest in inequality. Some reflect economic reality, like the global rise of inequality since the 1980s. Other reasons are internal developments in Neoclassical Economics, mainly the increased use of models of heterogeneous agents.

This paper belongs to the research on the determinants of inequality, on why it differs across countries and over time. The paper focuses on public policy, by which we mean the set of policies implemented by the government, and more broadly the public sector, including budgetary and non-budgetary policies as well. As explained below, most of the effects of public policy on inequality are quite straightforward, so we do not need to present theoretical models of such effects and the analysis is empirical.

Clearly, there are other variables that affect inequality, such as economic growth, as suggested by Kuznets (1955), globalization, or technical change, which widens gaps between skilled and unskilled workers. However, this paper shows that the effect of public policies is not only significant, but is quite large. One way to realize it is to look at the redistribution by direct taxes and subsidies, from economic income to disposable income. While the mean of the Gini coefficient of market income in the OECD countries in 2011 was 0.47, the mean of the Gini coefficient of disposable income in these countries in 2011 was 0.34. It is a large change. Furthermore, the standard deviation of the Gini of market income in OECD countries in that year was 0.048, while the standard deviation of Gini of disposable income was 0.062. Hence, labor market inequality tends to be more similar across countries than inequality of disposable income, which means that a significant part of the variability in inequality across countries is due to variability in fiscal policy.

The distinction between market income, as determined in the labor market, and disposable income, which reflects direct government intervention, plays an important role

in our analysis. In the first part of the paper, we analyze how fiscal policy affects redistribution from market to disposable income. In the second part, we examine how public policies affect inequality in market income, through various channels and mechanisms.

The empirical analysis of this paper focuses on the OECD countries. It is a small set of countries, around 30, and a rather uniform set of countries, as most of them are developed countries. However, the main benefit of using it is that the data on inequality are of high quality. In general, focusing on OECD also enables us to have data on most variables that come from the same source, which adds to their quality. Furthermore, although the OECD countries are similar with respect to their economic development, they differ significantly with respect to their public policies. Hence, focusing on this set of countries strengthens the ability to identify the effect of policy.

The first finding of the paper is that indeed the redistribution of income by direct taxes and transfers in OECD countries is significant and large. We then relate both direct taxes and welfare transfers to the general tendency of government to intervene in the economy. First, as a government intervenes more, it has higher expenditures and hence it needs to collect more taxes, including direct taxes. Second, welfare transfers are one of the main interventions in the economy, so they rise with the overall intervention as well. Hence, redistribution should increase with such intervention. We measure intervention by the share of public expenditures in GDP, which becomes our main explanatory variable.

Indeed, the analysis shows that the share of public expenditures in GDP has a negative, significant and large effect on inequality. A rise of such expenditures by an additional percent of GDP reduces inequality of disposable income by 0.35 percentage points of the Gini coefficient in almost all the tests we run. To rule out the possibility of a bias due to reverse causality or omitted variables, we test the effect of public expenditures on inequality by use of an instrumental variable. This is the ranking of public debt, which affects interest payments, where these are part of public expenditures. In addition to this instrumental variable, we add a time trend, since over the last decades public expenditures declined significantly due to the influence of neoliberal attitudes on policy makers. We find that the effect of public expenditures on the Gini of disposable income, as implied by the test with instrumental variables, is negative and significant.

The second stage of our analysis examines how public policies affect inequality of market income. There has been little research on such effects, so our analysis is very preliminary. We examine four policies that should affect the distribution of market income. The first is public expenditure on education. Public education has a strong effect on the supply of human capital and through it on the distribution of market income. A second policy is public investment in infrastructure. This policy reduces distances from the center to the periphery and thus helps to reduce inequality of market incomes. A third public policy that should affect the distribution of market incomes is hiring by the public sector, which is a large employer itself. A fourth policy that affects inequality of market income is regulation of labor markets, affected by the government as well.

We test how these four interventions by the public sector affect the distribution of market income across countries and over time and we find that the public policies we list above affect inequality as expected, although the effect is not always strong. We then search for instrumental variables for each of these mechanisms and find additional support to the effect of governments on inequality of market income. These results, together with the effect of fiscal policy on redistribution, show that governments not only affect inequality, but that their effect might be strong.

The literature on determinants of inequality is not new, but it suffers from the lack of sufficient data on inequality across countries. As a result, only recently we begin to see empirical studies, which try to estimate the effects of various variables on inequality. Barro (2000) is an early example of such a study, which also contains a thorough survey of the previous literature. Barro (2000) focuses mainly on the state of development and its effect on inequality, namely on the Kuznets hypothesis, and it does not explicitly include policy variables in the regressions. Another important survey of this area of research is Atkinson (1997). Recently there are a number of papers that study the redistribution of income by fiscal policy, from market incomes to disposable incomes, such as Causa and Hermansen (2017), Chu, Davoodi and Gupta (2004), Niehues (2010), Ospina (2010), Martinez-Vazquez, Vulovic and Moreno-Dodson (2012), Muinello-Gallo and Roca-Sagles (2013), Woo et al (2013) and Jäntti, Pirttilä and Rönkkö (2020). Our paper differs from these in two ways. First, we do not impose the assumption that the effect of market Gini on disposable Gini is 1. Second, we use instrumental variables to identify the fiscal effect on

inequality. Our paper also differs in analyzing the effects of public policy on the inequality of market incomes.

The structure of the paper is as follows. Section 2 presents the empirical analysis of redistribution from market incomes to net incomes by direct taxes and subsidies. Section 3 examines the effect of public expenditures on redistribution. Section 4 adds to the analysis the instrumental variables. Section 5 studies which public policies affect inequality of market income and Section 6 adds to the examination instrumental variables. Section 7 applies the results of the paper to examine how much of the rise in inequality in recent decades is due to public policies. Section 8 summarizes.

2. Redistribution of Income by Direct Taxes and Transfers

We begin our empirical analysis by examining how the shift from market income to disposable income reduces inequality. This is due to public intervention, since disposable income is equal to market income plus subsidies to households, minus direct taxes. To measure the aggregate effect of this change we regress the Gini of disposable income on the Gini of market income and on direct taxes and transfers. Although it seems intuitive to assume that the causality here goes from taxes and subsidies to disposable income, we discuss below the issue of endogeneity, both in Section 3, and by use of instrumental variables, in Section 4.

Our main data set is from the OECD, which covers a small number of countries, but has high quality data on income. It also has the benefit of covering mostly developed countries, which are therefore similar economically, so we can better identify the effects of different policies. The data cover the years 1976-2016, but some regressions cover fewer countries or less years, due to missing data for various variables.

We can describe the model we estimate by the following equation:

$$GN(j, t) = A_1 + B_1\, GM(j, t) + C_1\, DT(j,t) + D_1\, TR(j,t) + v_1(j, t). \qquad (1)$$

The variable GN(j, t) is the Gini of disposable income of country j at period t. The variable GM(j, t) is the Gini of market income of country j at period t. The fiscal variables are DT(j, t), which are direct taxes as percent of GDP and TR(j, t), which are welfare transfers as percent of GDP, both in country j at period t. Actually, all these variables are moving averages over five years, from t-4 to t. We use such 5 years moving averages to reduce

cyclical variation. The residuals of all regressions are denoted by v(j, t) for country j and period t. Whenever there is no cause for confusion, we omit time and country indices.

Variable	**2011 (1)**	**2011 (2)**	**2011 (3)**	**Pooled (4)**	**Pooled (5)**	**Pooled (6)**
GM	.832*** (.230)	.402*** (.134)	.433*** (.111)	.699*** (.046)	.439*** (.026)	.488*** (.022)
DT		-.645*** (.133)	-.496*** (.157)		-.658*** (.027)	-.494*** (.031)
TR			-1.466** (.611)			-1.605*** (.112)
Constant	-6.043 (10.74)	26.80*** (5.97)	25.18*** (4.86)	-1.57 (2.13)	25.66*** (1.24)	22.85*** (1.03)
R^2	0.31	0.60	0.65	0.33	0.67	0.73
Observations	42	34	34	784	683	666

1. Standard errors are robust.
2. Significance at 10 percent is denoted *, 5 percent by ** and 1 percent by ***.

Table 1: Effects of Direct Taxes and Transfers on Redistribution

Table 1 presents the results for a cross-section of countries at the year 2011, and for a pooled regression over the years 1991-2016.[1] The dependent variable in all regressions is the Gini of disposable income, GN. The preliminary results in Table 1 are already very interesting. Regressions (1) and (4) imply that the Gini of disposable income is 0.83 and 0.7 of the Gini of market income respectively, since the constant is insignificantly different from zero in both regressions. This means that disposable income is more equitable than market income. Note also that the variable GM explains only a small part of the fluctuations in GN, as the R^2 in the two regressions are only 0.31 and 0.33 respectively, which are quite low. That further justifies adding the policy variables in the other regressions.

Table 1 shows that even after adding policy variables, the Gini of disposable income depends significantly on the Gini of market income, where the regression coefficient is between 0.4 and 0.5. This result is interesting in itself. Many studies of redistribution use the difference between GN and GM as a dependent variable and regress it on various policy variables. Such studies, therefore, assume implicitly that the coefficient

[1] Regression (4) uses data from 1976-2016. Adding fiscal variables in the other regressions limits us to 1991-2016.

of GM is equal to 1. Our results show that this coefficient is significantly lower and we should better not impose such restrictions on the model.

However, the main result of Table 1 appears in regressions (3) and (6), which show that the distribution of disposable income changes significantly due to taxes and transfers. While differences in Gini of market income explain no more than a third of the variance of GN across countries, adding taxes and transfers increases the fitness of the regression by almost 40 points of R^2. It is surprising how progressive are direct taxes and transfers and how strongly they reduce inequality. Raising direct taxes by 1 percent of GDP reduces the Gini of disposable income by a half percentage point. Transfers are even more equitable, as raising them by 1 percent of GDP reduces the Gini by 1.5-1.6 percentage points. The results of the pooled regressions are quite similar to the cross section results. We have also tested the effects with country fixed effects and the results were similar, although the effects of direct taxes and transfers are slightly smaller.

3. Public Expenditures and Redistribution

Although direct taxes and transfers redistribute income directly, both depend on a more important and deeper variable, which is the degree of public involvement in the economy. The more active the government is in the economy, the higher are its expenditures, as it supplies more public services. It therefore levies more taxes, including direct taxes. Similarly, if the government is more involved in the economy, it supplies more social insurance. Hence, it has higher transfers. We therefore look for a variable that represents best this overall involvement of the government in the economy. Our choice is the share of public expenditures in GDP, which strongly affects both direct taxes and transfers, and through them it affects the distribution of income.

To test this hypothesis, we examine the relation between the Gini of disposable income and two main explanatory variables, the Gini of market income and public expenditures as percent of GDP, which we denote by E, also measured in five years averages. Hence, the new model we analyze is the following:

$$GN(j, t) = A_2 + B_2\, GM(j, t) + C_2\, E(j, t) + v_2(j, t). \qquad (2)$$

Table 2 presents the results of the regressions of equation (2), in regressions (1), (3) and (5).

The other regressions in Table 2 present an extended model of (2), which controls also for the relative sizes of direct taxes and transfers, DT/E and TR/E, respectively. This is the following model (3):

$$GN(j, t) = A_3 + B_3\, GM(j, t) + C_3\, E(t, j) + D_3\, DT/E(j, t) + E_3\, TR/E(j, t) + v_3(j, t) \qquad (3)$$

The additional variables in model (3), DT/E and TR/E, control respectively for the relative preference to finance expenditures by direct taxes rather than other taxes and for the importance of welfare relative to the other spending by the government. All variables are in percentage points and not real numbers. The tests in table 2 are cross-section, pooled with time fixed effects and panels with time and country fixed effects.

Variables	**2011 (1)**	**2011 (2)**	**Pooled (3)**	**Pooled (4)**	**Panel (5)**	**Panel (6)**
GM	.668*** (.119)	.658*** (.137)	.647*** (.032)	.582*** (.023)	.466*** (.025)	.486*** (.024)
E	-.478*** (.076)	-.403*** (.080)	-.427*** (.019)	-.360*** (.011)	-.231*** (.015)	-.359*** (.020)
DT/E		.021 (.063)		-.032*** (.014)		-.137*** (.016)
TR/E		-.767*** (.262)		-.717*** (.014)		.075 (.093)
Constant	20.32*** (5.17)	19.99*** (6.53)	18.92*** (1.45)	24.06*** (1.44)	18.67*** (1.13)	30.21*** (1.83)
Country FE	N	N	N	N	Y	Y
R^2	0.61	0.69	0.67	0.74		
R^2 within					0.47	0.56
Obs.	31	29	535	483	535	483

1. Standard errors are robust in cross section and pooled regressions, and clustered around countries in panel regressions.
2. Significance of 10 percent is denoted by *, of 5 percent by **, and of 1 percent by ***.

Table 2: Effects of Public Expenditures on Redistribution

Table 2 shows that public expenditures have a significant and large relation to the reduction of Gini from market income to disposable income. We can therefore conclude that the degree of public intervention in the economy, as measured by the share of public expenditures in GDP, E, has significant relation to redistribution. Actually, an increase in

public expenditures by one percent of GDP reduces the Gini coefficient of disposable income by .36 percentage points over the whole period. Since public expenditures in OECD countries range between 35 and 55 percent of GDP, this variable can account for 7 percentage points of the variability of Gini of disposable income Gini in the OECD, which is close to the actual variability. Hence, public expenditures play a major role in understanding differences in inequality over time and across countries.

Furthermore, the public expenditures almost completely replace the roles of direct taxes and transfers in explaining redistribution. First, the coefficient of E is very similar when we control for DT/E and TR/E and when we do not, in all three types of tests in Table 2. In 2011, adding these controls changes the coefficient from -.48 to -.40, in the pooled regression it changes from -.43 to -.36, and in the panel regression, adding the controls even strengthens the effect of E from -.23 to -.36. A second indication to the significant role of public intervention emerges from observing the R^2 in these regressions. Note that in the pooled regressions public expenditure raises R^2 from 0.35 in regression (4) in Table 1 to 0.67 in regression (3) in Table 2. In comparison, direct taxes and transfers raise the R^2 from 0.35 in regression (4) in Table 1 to 0.73 in regression (6) in Table 1. Since the difference is not large, we deduce that public expenditure captures most of the combined effect of direct taxes and welfare transfers.

Although the variable E captures most of the redistributive role of direct taxes and transfers, it seems from regressions (2) and (4) in Table 2 that transfers still retain a significant effect on inequality of disposable income. This is reasonable as transfers affect mainly the lower tail of the distribution of income, by helping the very poor. Hence, their effect on inequality should indeed be strong. However, adding country fixed effects to the regression reduces the effect of transfers sharply and it becomes insignificant, as regression (6) shows. This may be an indication that welfare policies are not so variable over time and reflect to a large extent country characteristics and values, captured by the country fixed effects.

Finally, we turn to the issue of causality. The regressions in Table 2 present correlations, which are not a full test of causality. We should ask ourselves whether there might be reverse causality, namely whether inequality might affect fiscal policy. Indeed, a famous paper by Meltzer and Richard (1981) has claimed that the rise of public spending

in the 20th century was mainly due to public pressure to redistribute income in order to reduce inequality. We deal with this issue in Section 4 by use of instrumental variables. However, the analysis in Table 2 already indicates that this argument for reverse causality is highly problematic.

If the political-economic effect of Meltzer and Richard (1981) is valid, we should observe a positive correlation between inequality and public expenditures. If there is higher inequality in the economy, there should be greater pressure to redistribute income and as a result, public expenditures should increase. However, our empirical results are opposite, as the correlation between public expenditures and inequality is negative. Furthermore, if indeed there is some positive effect of inequality on fiscal policy, as suggested by Meltzer and Richard (1981), then the negative correlation we find in Table 2 is an underestimate of the actual redistribution effect.

4. Using IV to Support the Effect of Redistribution

In this section, we reexamine the claim that the correlation between public expenditures and inequality of disposable income is due to redistribution, and not due to a political economy mechanism, as claimed by Meltzer and Richard (1981). This section uses an instrumental variable to support our claim that the causality runs from public expenditures to inequality of disposable income and not the other way around. Interestingly, we find some support for the Meltzer and Richard claim, but with respect to inequality of market income, which affects public spending, and not to inequality of disposable income.

Therefore, this section looks for a variable, as exogenous as possible, which affects public expenditures, but does not directly affect inequality of disposable income. Our choice is the Standard and Poor ranking of sovereign debt of the country. This financial ranking affects the interest rate the country faces and so it affects interest payments on the public debt. This is how the ranking affects public expenditures. It is hard to think of any other way this ranking might affect inequality of disposable income. Similarly, it is hard to think of ways in which inequality can affect this ranking, performed by a global firm.

The S&P ranking has 25 possible values from NR to AAA. We translate these letter values to a numerical ranking on a scale from 1 to 25. The Standard and Poor ranking of sovereign debt differentiates between foreign and local currency debts. We present the

results for both foreign ranking, denoted RANK-F and the average of foreign and local debt ranking, denoted RANK, although there is a strong correlation between the two. S&P also provide separate ranking for short-term debt and for long-term debt, which is over a year. Our analysis uses long-term debt ranking only.

In addition to this instrumental variable, we control in our tests for the time trend, denoted TIME. The reason is that in recent years, many OECD countries experienced a gradual decline of their public expenditures relative to GDP, due to the growing influence of neoliberal attitudes. This political trend did not cause a sudden decline of public expenditures, but triggered a gradual decline. This is why we add the time trend to the tests, to control for such a political gradual effect.

We have examined two more instruments in addition to ranking. One variable represents natural disasters, like earthquakes, floods, or diseases. We focused on the number of homeless per million, caused by the disaster, taken from the data set EM-DAT (2017). Our hypothesis was that the number of homeless should increase expenditures, due to the need to assist them and so it should reduce inequality. Note, that if there is a direct effect for this number on inequality, it should be positive, since such disasters usually hit the poor harder. However, despite being a potentially good instrument, this variable came out insignificant and so we decided not to use it.[2] Another potential instrument we have considered was segregation in society, which usually has an effect on solidarity and as a result on redistribution as well. Indeed, Tosu and Vilalta-Bufì (2021) show that such segregation reduces redistribution through taxes and welfare payments. However, the data on segregation are available only for a small subset of our data set, so we did not use it.

The instrumental variable model consists of two main equations. The first stage equation determines the share of public expenditures in GDP:

$$E(j, t) = A_4 + B_4\, GM(j, t) + C_4\, TIME(t) + D_4\, RANK(j, t) + v_4(j, t). \quad (4)$$

In some of the first stage regressions, the variable RANK-F replaces RANK. For the second stage estimation, we first calculate the fitted value of public expenditures, FE, from (4):

$$FE(j, t) = A_4 + B_4\, GM(j, t) + C_4\, TIME(t) + D_4\, RANK(j, t).$$

We then use it to estimate the second stage regression:

$$GN(j, t) = A_5 + B_5\, GM(j, t) + C_5\, FE(j, t) + v_5(j, t). \quad (5)$$

[2] We have tried another variable from this data set as well, with similar success.

Table 3 presents the results of the 2SLS estimation of the model of equations (4) and (5). As in previous regressions, we use data from OECD countries in the years 1995-2015. All regressions are panel estimations with country fixed effects. Regression (1) examines only the time trend. Regressions (2) and (3) add the average ranking and the foreign ranking, respectively. Note, that first stage regressions include the Gini of market income, GM, since it appears in the second stage. In addition, this variable enables us to learn about the effect of Meltzer and Richard (1981), so its inclusion is valuable.

Regression	**(1)**	**(2)**	**(3)**
First Stage: Dependent Variable: Share of Public Expenditures in GDP (E)			
TIME	-.096*** (.024)	-.126*** (.032)	-.110*** (.029)
RANK		-.596*** (.102)	
RANK-F			-673*** (0.96)
GM	.677*** (.088)	.438*** (.115)	.395*** (.109)
Second Stage: Gini of Disposable Income (GN)			
GM	.739*** (.105)	.712*** (.098)	.675*** (.074)
FE	-.707*** (.144)	-.669*** (.102)	-.605*** (.075)
Under-Identification Test Kleibergen-Paap (prob.)	13.40 (0.000)	26.40 (0.000)	40.16 (0.000)
Hansen-Sargan Test (prob.)	(0.000)	2.222 (0.14)	1.566 (0.21)
Davidson-MacKinnon Test of Exogeneity (prob.)	(0.000)	(0.000)	(0.000)
No. of Countries	34	34	34
No. of Observations	535	432	437

Table 3: Effects of Public Expenditures on Redistribution – Instrumental Variables

The effect of the time trend in the first stage is in the right direction, as it has a clear negative effect on public expenditures, reflecting the gradual implementation of policies inspired by neoliberalism. Public expenditures decline on average by about one tenth of a percent every year. This means that over the 20 years of the sample, the trend accounted

for a decline of 2 percent of GDP. The instrumental variables of S&P ranking reduce public spending as they lower the interest rate on public debt, both for foreign ranking and for average ranking.

The first stage regressions also show that inequality of market income, GM, has a significant positive effect on public expenditures, in all regressions. On average, a rise of one percentage point of Gini Market increases expenditures by 0.35 percent of GDP. This supports the Meltzer and Richard (1981) claim that inequality affects public spending positively. However, this is inequality of market income, while inequality of disposable income has a negative correlation with public spending, as Tables 2 and 3 show.

The second stage regressions show that the instrumental variables have indeed the right effect on inequality of disposable income through public expenditures. The effect is negative, significant and is even stronger than in the basic regressions in Table 2, as it is around -0.6, while in Table 2 it is around -0.4. The effect of inequality of market income, GM, on GN is quite similar to the effect in Table 2.

Finally, the Kleinbergeer-Paap tests show that the probability of under-identification is zero for all regressions. The two second-stage regressions, for the instrumental variables RANK and RANK-F, pass the joint Hansen-Sargan test for over-identification, so the instruments are uncorrelated with the error terms. Finally, all regressions pass the Davidson-MacKinnon test of over-identification. Hence, the instrumental variables analysis supports our claim, that public expenditures determine inequality of disposable income and not the other way around.

5. Inequality of Market Incomes

The previous three sections analyze the redistributive role of public policy on inequality of disposable income. They show that redistribution is significant and large. This section begins to study how public policy affects the more basic distribution of income, determined in the labor market, which is the distribution of market income. As the introduction mentions, there are four main public interventions, which should affect the distribution of market income. One is spending on public education, the second is hiring in the public sector, the third is investment in infrastructure, which reduces effects of distance, and the fourth is labor market regulation.

Public expenditures on education affect the supply of human capital and through it the inequality of wages. Many studies have shown that years of schooling have a strong effect on wages. Many other studies have shown that private investment in human capital is sub-optimal, due to imperfections in credit markets. These imperfections bar families with low income from investing sufficiently in schooling.[3] As a result, public education can increase the total amount of schooling, as it helps children from low-income families to acquire education. Thus, public expenditures on education affect the distribution of market income.

To examine this effect of public education on inequality empirically, we split it to two stages. First, public expenditures on education increase schooling. This is an economic effect, which reflects imperfect credit markets. The second stage is the effect of schooling on inequality, which is more mechanical. This effect is non-monotonic. To understand it consider the transition from high-school education to higher education, which is relevant to the OECD countries, in our sample. Once this transition begins, when most people have only high-school education, schooling increases inequality. As more people acquire higher education, inequality should begin to decline at one point.[4] Hence, the effect of schooling on inequality of market income is first rising and then declining. As a result, the overall effect of education expenditures is quite complex. First, expenditures on education affect the growth of schooling and not its absolute level. Second, the level of schooling has a non-monotonic effect on inequality.

A second way the public sector might affect the distribution of market incomes is through its role as a large employer. Its hiring policy affects the distribution of wages in two main ways. First, it increases the demand for highly educated jobs, as these are the main jobs in the public sector: teachers, medical staff, lawyers, etc. This should increase inequality of market incomes. Second, less educated workers in the public sector earn higher wages than in the private sector, due to higher unionization in the public sector. This should reduce inequality. The two effects work in opposite directions. However, the first effect exists even if the public sector is relatively small, while the second effect operates

[3] See Galor and Zeira (1993) and Banerjee and Newman (1993) for the theoretical argument.
[4] This non-monotonic effect is similar to the famous argument of the Kuznets Curve (1955), except that he describes movement from agriculture to industry, while we describe here acquisition of higher education.

mainly when public employment is high, since only then the government hires many low-skilled workers. Hence, we should expect this variable to have a non-monotonic effect on inequality, which we test as well.

A third public policy that should have an effect on inequality of market income is public investment in infrastructure and spending on public transportation. Such policies reduce the distances between the center and the periphery and thus help poorer people to acquire better education and later on in life get better jobs. Hence, we assume that such policies should reduce inequality of market incomes.

The public sector not only finances activities and employs workers, but it is also a regulator. Hence, the fourth public policy that should affect inequality of market income is regulation of labor markets. This regulation is of course multi-dimensional and it appears in many policies. One important regulation in the labor market is the determination of minimum wages. However, our attempts to examine the effect of minimum wages in this international setting failed. First, a simple regression shows that minimum wages (relative to the median or average wage) has a significant, but positive effect on inequality of market income, just opposite to what we expect. This implies that the regression captures mainly the opposite effect, the political pressure of inequality on minimum wages. Using instrumental variables to examine the direction of causality failed as well.[5]

As a result, we use another variable, which represents regulation of labor markets. This is the index EPL, Employment Protection Legislation, as measured in OECD countries. This index measures procedures and costs involved in laying-off individuals or groups of workers. More specifically, it is a survey among experts, asked 21 questions in three areas: protection of workers against individual layoff, regulation of temporary employment, and specific requirements for collective layoffs. The survey processes the answers on a scale between 0 and 6, where higher values represent stricter regulation, and then calculates a general score. In this section we anticipate that EPL should reduce inequality, but we are aware that the effect might be weak. The reason is that EPL affects mainly relative incomes of labor vs. capital. However, surveys of income, which are the

[5] Autor, Manning and Smith (2016), show that lower minimum wages account for some rise in inequality in the US, mainly at the lower tail of the distribution, although the effect is not large.

base for calculations of Gini coefficients, underreport income from capital. Hence, we expect the effect of EPL on Gini of market income to be weak.

We summarize the above discussion in a model of two equations. The first one describes the four variables that affect the inequality of market income:

$$GM(j, t) = A_6 + B_6\, SC(j, t) + C_6\, SC(j, t)^2 + D_6\, PE(j, t) + E_6\, PE(j, t)^2 + F_6\, INFRA(j, t) + G_6\, EPL(j, t) + v_6(j, t). \quad (6)$$

The variables that appear in this equation are average schooling, denoted SC, public employment, denoted PE, investment in infrastructure as percent of GDP, denoted INFRA, and EPL. The second equation in the model describes how the policy variable of public expenditures on tertiary education, denoted EDU, affects the level of schooling:

$$SC(j, t) = A_7 + B_7\, SC(j, t\text{-}1) + C_7\, EDU(j, t) + v_7(j, t). \quad (7)$$

Note that the underlying assumption behind this equation is that public expenditures in education affect the annual change in schooling. Under this assumption, the coefficient B_7 in equation (7) should be 1. However, our model allows for a more general specification, where B_7 can differ from 1 and we estimate it from the data.

Table 4 presents the results of the regressions that test the relationship between Gini of market income and public employment, INFRA, EPL and schooling. Later we examine how public education affects schooling. Since these are not the only variables that affect inequality of market incomes, we add to all regressions country and time fixed effects. We have also examined how the results might change when adding specific variables that should affect market income inequality, like development, as suggested by Kuznets (1955), and openness, as suggested by many studies.[6] We find that these variables become insignificant once we control for countries and time. Technical change should also affect inequality, as many economists claim that it is skill biased (SBTC), so it should increase inequality. However, it is hard to capture this effect across countries, since countries' adoption of technical change might be endogenous.[7] Using a global measure for technical change is also problematic, as time fixed effects already capture it.

[6] Helpman (2018) is a recent survey of the various effects of globalization on inequality. It reaches the conclusion that globalization indeed has increased inequality, but it can account for only a small part of the increase in inequality in recent decades. See also Helpman (2017).

[7] See Alesina, Battisti and Zeira (2018) on differences in technology adoption across countries.

The variables used in Table 4 are average schooling, SC, measured in number of years, public employment, PE, measured in real numbers, as it should be squared, investment in infrastructure, INFRA, measured in percent of GDP and EPL, ranked between 0 and 6. We use moving averages of 5 years for all variables, to smooth cyclical fluctuations. Our set of observations is OECD countries in the years 1976-2014. Some regressions use fewer countries or years, beginning either in 1986 or in 1996, due to lack of data for some variables. All regressions are panels with country and time fixed effects.

Dependent Variable: Gini of Market Income (GM)					
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
SC	0.120*** (0.026)				0.189*** (0.035)
SC²	-0.005*** (0.001)				-0.008*** (0.002)
PE		2.072*** (0.543)			1.435*** (0.440)
PE²		-3.103*** (0.910)			-2.064*** (0.839)
INFRA			-0.027*** (0.003)		-0.020*** (0.004)
EPL				-0.032*** (0.009)	-0.00003 (0.009)
R^2 within	0.33	0.56	0.28	0.45	0.31
Countries	40	37	39	39	29
Observations	594	600	567	523	341
1. Standard errors clustered around countries. 2. Significance of 10 percent is denoted by *, of 5 percent by **, and of 1 percent by ***.					

Table 4: Public Policies (without Education) and Inequality of Market Income

The results of Table 4 strongly support equation (6) of the model both separately for each variable and for all four together. Note that a regression without any variable, with only country and time fixed effects, yields a within R^2 of 0.16.[8]Adding the four variables of equation (6) increases the explanatory power of the regression, from R^2 of 0.16 to 0.31 in regression (4). All variables in equation (6) come out significant, except for EPL, which becomes insignificant when added to the other variables, as regression (5) shows.

[8] We run this regression over the shortest period, to compare it with regression (5).

The regressions in Table 4 confirm our predictions above. First, schooling has a non-monotonic, inverted U-shape effect on inequality of market income. The effect of schooling on Gini of market income changes from positive to negative in both regressions (1) and (5) at 12 years of schooling.[9] Public employment also has a non-monotonic inverted U-shape effect on Gini of market income. The switch between a positive and a negative effect on inequality is 33 percent of the workforce, according to regression (2) and 35 percent, according to regression (5). Hence, as long as most of the public sector workers are teachers, doctors, and administrators, which means highly-educated, such hiring raises inequality. Interestingly, the average share of public employment in our sample is 24 percent. Hence, the net correlation between public employment and inequality of market income in our sample should be positive on average.

As expected, investment in infrastructure reduces inequality and this relation is significant in regressions (3) and (5) with a similar size of coefficient. The effect of labor market regulation, EPL, is negative and significant in regression (4), as anticipated. However, when the Gini market is regressed on all four variables together in regression (5), the effect of EPL becomes insignificant. This fits our early hypothesis, that the effect of EPL on inequality of market income should be negative, but weak.[10]

We next turn to estimate equation (7) in the model. This estimation examines how public spending on tertiary education affects the growth of average years of schooling.[11] To examine it we test how years of schooling depend on lagged years of schooling, and on EDU. Table 5 presents the results of these estimations. The dependent variable in all regressions is SC and the explanatory variables are EDU, public expenditures on tertiary education, and SC with a lag. In most regressions, the lag is one year, but in some regressions, it is a 5 years lags. All variables are moving averages over 5 years. For robustness, Table 5 presents results for three types of regressions, standard fixed effects, Arellano-Bond dynamic panel estimation and Blondell-Bond dynamic panel estimation.

[9] Interestingly, Israel experienced rising and then declining Gini of market income during a period of expanding schooling, after the 1990s. The year the Gini began to decline was 2000, when average schooling just passed 11 years.
[10] We have also reexamined the results by adding total public expenditures, E, to the regression. Interestingly, it did not change much the effects of public employment and of investment in infrastructure.
[11] We focus on tertiary education, as it is the main addition to schooling in the OECD countries.

Dependent Variable: Average Years of Schooling (SC)					
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
SC(-1)	0.939*** (0.010)	0.928*** (0.008)	0.912*** (0.005)		
Conf. Int.	0.92- 0.96	0.91- 0.94	0.90- 0.92		
EDU(-1)	0.017*** (0.005)	0.015*** (0.004)	0.023*** (0.004)		
SC(-5)				0.515*** (0.035)	0.538*** (0.086)
Conf. Int.				0.45 – 0.58	0.37 – 0.71
EDU(-5)				0.068*** (0.015)	0.119*** (0.039)
Regression	Fixed Effects	Arellano-Bond	Blondell-Bond	Fixed Effects	Blondell-Bond
Countries	38	38	38	37	31
Observations	557	515	557	426	87
1. Standard errors clustered around countries. 2. Significance of 10 percent is denoted by *, of 5 percent by **, and of 1 percent by ***.					

Table 5: The Dynamics of Years of Schooling

The results of all regressions in Table 5 are similar and fit our basic understanding, that higher public education spending increases the average schooling in the country. The coefficient on lagged years of schooling is between 0.91 and 0.94, but significantly lower than one, as shown by the 95% confidence intervals. This is since every year some people leave the sample and that reduces average schooling if there are no new graduates. Clearly, a lag of 5 years leads to a significantly lower coefficient of lagged SC, since a larger number of educated people leaves the sample. Hence, the results of Table 5 lend support to equation (7) in the model and to our assumptions on the dynamics of schooling.

Note that all variables in equation (6) are policy variables, except for schooling. The growth of this variable is itself a result of a policy variable, public expenditures on education, EDU. Hence, the effect of this policy variable on inequality is not direct. However, we can estimate a more direct connection between the policy variable EDU and Gini of market income in the following way. We can use the results of estimation of equation (7) to create recursively a new variable, fitted schooling, by using the following:

$$FSC(j, t) = A_7 + B_7\, FSC(j, t-1) + C_7\, EDU(j, t). \qquad (8)$$

The initial value of this variable, FSC(j, 0) is equal to the actual initial value of schooling SC(j, 0), but all following variables follow the dynamic equation (8). We can then regress the Gini of market income on this fitted variable FSC, which depends only on the time series of the policy variable EDU.

Table 6 presents tests of the effect of fitted schooling on inequality of market income, namely on GM. To track non-monotonicity, we test for both FSC and the square of FSC. We test the effect of one year lagged FSC in regression (1), where the coefficients by which we calculate the variable are from regression (3) in Table 5. For robustness, we also test in regression (2) for FSC derived by using 5 years' lag of education costs. We derive this variable, which we denote by FSC5, from regression (4) in Table 5. Regressions (3) and (4) add to FSC and to FSC5, respectively, the other variables from Table 4.

Dependent Variable: Gini of Market Income (GM)				
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**
FSC	0.258*** (0.063)		0.580*** (0.072)	
FSC²	-0.011*** (0.003)		-0.025*** (0.003)	
FSC5		0.232* (0.133)		0.926*** (0.125)
FSC5²		-0.009* (0.006)		-0.039*** (0.005)
PE			2.145*** (0.450)	2.596*** (0.430)
PE²			-3.482*** (0.873)	-3.612*** (0.880)
INFRA			-0.018*** (0.003)	-0.020*** (0.003)
EPL			0.004 (0.010)	-0.005 (0.010)
R^2 within	0.10	0.15	0.37	0.58
Countries	35	33	28	25
Observations	449	355	273	224

Table 6: Effects of Education with Other Policies on Inequality of Market Income

The results of Table 6 fit our hypotheses very well, except for the effect of EPL, which is insignificant in all regressions, as in regression (5) in Table 4. First, both cases of

fitted schooling have a non-monotonic, inverted U-shape effect on inequality of market income. In regressions (1), (3), and (4), the years of schooling where the Gini of market income begins to decline with additional years of schooling is between 11.6 and 11.8. Only in regressions (2) it begins to decline at 12.8 years of schooling. However, this regression estimates have lower significance than the other regressions. Hence, years of schooling have the expected effect on inequality of market income. The effects of the other variables on GM are similar to those in Table 4. Public employment raises inequality below 30 percent and reduces it when public employment exceeds 30 percent of total labor.

As in Section 3, we ask ourselves whether Table 6 presents only correlations, or that we can view them as reflecting causality as well. First, it is common in economics to view policy variables as more exogenous than pure economic variables. However, since the 1980s, the rise of the new political economy led economists to view policy decisions as endogenous as well. Similarly, we can ask ourselves whether the policy variables we study above react to inequality and not the other way around. As in Section 3, the directions of the correlations do not support this possibility. If inequality should affect investment in infrastructure, the sign of the effect should be positive, as higher inequality puts pressure on the government to increase mobility. However, the correlations between inequality and spending on infrastructure in Tables 4 and 6 are negative.

A similar argument holds for public hiring. Greater inequality might exert pressure on the government to hire more workers, so we should observe a positive correlation. However, the correlation for most countries is very small. Similarly, high inequality should push the government to invest more in education and we should observe a positive correlation between the two variables. According to Table 6, this correlation is close to zero and even negative, as many OECD countries have more than 11 years of schooling on average. In the next section we try to use instrumental variables to strengthen our claim that the policy variables affect inequality of market income and not the other way around.

6. Instrumental Variables Tests on Inequality of Market Income

Section 5 claims that the four variables, public education expenditures, public employment, investment in infrastructure and employment protection legislation, affect inequality of market income. It shows that there are indeed significant correlations between these

policies and the Gini of market income, except that the variable, which measures regulation, EPL, becomes insignificant when added to the other variables. This section moves one-step ahead, and tries to supply some evidence, by use of various instrumental variables, that the causality goes from these variables to the inequality of market income.

We examine the following instrumental variables. For public education expenditures, we consider the public debt as share of GDP, in percent, denoted DEBT. Since the size of the public debt affects the size of interest paid by the government, it should have a negative effect on other public expenditures, including education. Once the budget is tighter due to high interest payments, the government tends to reduce other expenditures. We examine whether the size of public debt has a negative effect on the growth of schooling in the country. This is a reasonable IV since there is no intuitive reason for a direct relationship between public debt and the growth of schooling.[12]

For a similar reason, we use the size of the debt in percent of GDP as an instrument for investment in infrastructure as well. High interest payments put budgetary pressure, which leads to reduction in such investment. This implies that we expect the public debt to have a positive effect on inequality, through investment in infrastructure. One might raise doubts on this choice of instrumental variable, claiming that governments in countries with higher inequality tend to spend more and thus accumulate more debt. However, this might affect future levels of debt and not current or past levels.

To the debt, we add another instrumental variable for public investment in infrastructure, which is the Standard and Poor ranking of the country, used also in Section 4, as an instrument to GN. The reason this is a good instrument for public investment is that often governments need to borrow to finance investments and thus, the interest rate the government faces should have an effect on such investments. The higher the rank of the country, the lower the interest rate it faces and thus the larger its investments in infrastructure. Hence, the rank should have a negative relation with inequality of market income. Interestingly, this is opposite to the relation of the rank with inequality of disposable income, shown in Section 4.

[12] One might claim that countries with higher school attainment should tend to have lower public debt, but here we find correlation between debt and the growth of schooling, not its level. Furthermore, there are countries with high debts, which also have high levels of schooling, like the US, Belgium, Japan, and more.

The instrumental variable we use for public employment is the rate of unemployment. We conjecture that in periods of high unemployment, there is political pressure on the government to reduce the high rate, and one of the measures it usually applies is to increase public hiring. We therefore show that the rate of unemployment increases public employment and as a result, it first increases inequality and then reduces it. Finally, the instrumental variable we use for the employment protection legislation (EPL), is voter turnout rate, derived from IDEA. This rate is the percent of voters out of those who are eligible to vote. Voter turnout indicates how many people care about social, economic and political issues and thus it should create a pressure on the government to intervene more in the economy, including through employment protection legislation.

Regression	**(1)**	**(2)**	**(3)**
First Step			
Dependent Variables	**PE**	**INFRA**	**EPL**
U	.0013*** (.0002)		
U^2	-.00003*** ($7\ e^{-6}$)		
DEBT		-.348*** (.076)	
RANK		.052*** (.011)	
VOTE			.388*** (.159)
TIME	.0005*** (.00004)		-.0023*** (.0008)
Second Step Dependent Variable: Inequality of Market Income (GM)			
Fitted PE	8.404*** (2.073)		
(Fitted PE)^2	-15.248*** (4.419)		
Fitted INFRA		-.085*** (.011)	
Fitted EPL			-.713*** (.187)
No. of Observations		398	
Klinbergen-Paap test **P-value**	18.621 (0.0001)	34.347 (0.0000)	15.232 (0.0005)
Hansen test	2.659	0.026	0.340

P-value	(0.103)	(0.872)	(0.56)
Davidson-MacKinnon test	36.636 F(2,543)	197.7 F(1,364)	245.015 F(1,482)
P-value	($1.2\ e^{-15}$)	($3.6\ e^{-36}$)	($6\ e^{-45}$)
1. Standard errors clustered around countries. 2. Significance of 10 percent is denoted by *, of 5 percent by **, and of 1 percent by ***.			

Table 7: Effects of Instrumental Variables through Public Employment, Investment in Infrastructure and EPL

Table 7 presents the results of the instrumental variables tests for three of the variables, public employment, investment in infrastructure and EPL. The effects of all variables are significant, and all variables pass the over-identification and under-identification tests as required. This further supports our hypothesis that these variables, public employment share out of total employment, investment in infrastructure and employment protection legislation, affect the inequality of market Gini. However, the instrumental variables we use might raise some questions marks, which we discuss next.

First, note that unemployment might affect inequality directly, as reducing income of people to zero, when they become unemployed, should increase inequality. However, the effect we identify in regression (1) in Table 7 is more intricate. Unemployment increases inequality if public employment is below 28 percent, but reduces it above it. It therefore implies that we discover a strong non-monotonic effect, which is in addition to the direct effect. Thus, even if we subtract the direct positive effect, unemployment still has a non-monotonic effect through public employment, except that it might change sign at a lower level of public employment.

Critiques might claim that there is a correlation between debt to GDP ratio or the debt ranking of a country and inequality, as inequality might increase welfare spending and that might raise debt and lower ranking. However, this is a correlation with future debt levels, while regression (2) deals with current debt and ranking and we get similar results with lagged debt and ranking as well. Finally, one can also claim that inequality might affect voting, as higher inequality should lead to higher voting rates. However, our analysis reveals an opposite correlation, as higher voting rates lead to lower inequality. This strengthens our claim that the channel of influence is from employment protection to inequality.

Next, we turn to examine an instrumental variable for public education expenditures. Here the analysis might be much more complicate, as the effect of education expenditures on inequality goes through stages. First, it affects the annual change of schooling and then the accumulated level of schooling affects the inequality of market income. To overcome this complexity, we limit ourselves to examining the effect of public education on schooling. We assume that the correlation between schooling and the distribution of income is rather mechanical, due to the strong relationship between schooling and income, which is a well-known result. Regression (1) in Table 6 captures this relationship well. Thus, the following instrumental analysis focuses on the effect of public (tertiary) education expenditures on schooling.

However, this relationship is complex as well, as it is dynamic. Public education affects the annual change in schooling rather than the level of schooling. We therefore need a dynamic test, and not the standard IV tests. Hence, we examine the effect of the instrumental variable, which is public debt, by two regressions, in two steps, as described in Table 8. In the first regression, public-education spending depends on public debt with a lag. The second step runs a regression of schooling, on schooling with a lag, together with the fitted public education expenditures.

Regression	**(1)** **First Step**	**(2)** **Second Step**
Dependent Variable	**EDU**	**SC**
Explanatory Variables		
DEBT (-5)	-.533*** (.132)	
Constant	5.418*** (.102)	
SC (-1)		.998*** (.003)
Fitted EDU		.016*** (.006)
Type of Regression	**Fixed Effects**	**Blundell-Bond**
R^2 within	0.1656	
No. of Countries	34	33
No. of Observations	499	585
1. Standard errors clustered around countries. 2. Significance of 10 percent is denoted by *, of 5 percent by **, and of 1 percent by ***.		

Table 8: Effect of Education Expenditures on Schooling with IV Debt

Regression (1) in Table 8 shows that the debt has a strong negative and highly significant effect on spending on tertiary education. Regression (2) shows that the fitted education costs have a strong and significant effect on the change in schooling. This is the change in education as lagged schooling have an effect of almost 1 on current schooling. Note also that the results with fitted EDU are very similar to the results with actual EDU, in regressions (1), (2), and (3) in Table 5. This further supports the use of DEBT as an instrumental variable for education costs.

7. The Rise of Inequality and Public Policies

There is much public discussion on the rise of inequality in developed countries in recent decades. Our results can shed some light on this issue as well. To see it, examine the average Gini coefficients in the OECD countries over the years 1996-2015. We have to be careful when presenting such averages since there has been a significant composition change during this period. A number of East European countries joined the OECD and since they had rather low levels of inequality, they biased somehow the total average. We therefore examined only the countries for which we had data throughout the whole period. These are 14 countries, Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, Netherlands, Norway, New Zealand, Sweden and the USA.

The average Gini coefficient of market income for these countries increased from 0.455 in 1996 to 0.467 in 2015. It therefore increased by 1 percentage point on average. The average Gini coefficient of disposable income in these countries increased by more, from 0.287 in 1996 to 0.307 in 2015. It therefore increased by 2 percentage points. One can say that the rise of inequality in these countries has been quite small, but we should take into consideration two points. The first is that these are averages and inequality increased much more in some countries, like the US, Sweden, Denmark, Finland and Israel, rather than the others. The second point is that inequality is calculated by the official data of OECD and other countries as well, is biased. The data are collected from surveys, which report fully income from labor and underreport income from capital. Once one considers

capital income, the changes in inequality appear to be much more dramatic, as shown in Piketty (2014) and in the website of Alvaredo et al (2014).[13]

Our analysis of public policy and inequality enables us to examine what contributed to the rise in inequality in those two decades and especially what caused the rise in inequality of disposable income. Public expenditures as a share of GDP decreased significantly during these two decades. While the average level of public expenditures in the 14 OECD countries mentioned above was 52.7 percent of GDP in 1996, it declined to 46.8 percent of GDP by the year 2015. That means that public expenditures as percent of GDP declined on average by 5.9 percent during this period. This is a significant decline and according to our results in sections 3 and 4, it accounts for a rise in the Gini of disposable income of 2 percentage points, which is the actual rise. Hence, the changes in fiscal policy during these two decades can alone account for the entire rise in inequality of disposable income.

It is interesting to examine changes in inequality in individual countries. Gini of disposable income increased mostly in Sweden, by 6 percentage points. This happened without much change in inequality of market income, which declined by 0.7 percentage points. The rise in inequality in Sweden was due to lower redistribution, as public expenditures declined by 12 percent of GDP. Israel went through a similar process, as its Gini of disposable income rose by 2.8 percentage points, although Gini of market income declined by 2.85 percentage points. Indeed, its public expenditures declined by 9.5 percent of GDP. Japan, on the contrary, experienced a sharp rise in inequality of market income, by 9.3 percentage points, but its Gini of disposable income rose by only 1.15 percentage point. This has a result of a rise of 5 percent of GDP in public expenditures.

However, the rise of inequality cannot be attributed solely to the decline in redistribution, as there was a significant rise in inequality of market income. Some of this rise was due to public policies as well, but it was not as strong as the effect of redistribution. Note for example Japan, where the rise in inequality of market income was the highest. Investment in infrastructure in this country declined by close to 1 percent of GDP, which

[13] We tried to use Alvaredo et al (2014) data for some tests but faced a number of problems. First, they do not supply data on inequality of disposable income. Second, they do not calculate Gini coefficients, but other statistics, which made the results of such tests less comparable with other tests. Generally, such tests yielded similar results.

should increase this inequality by 0.02 percentage points. The rise of schooling in Japan accounts for a similar rise in inequality. Hence, this is clearly only a small part of the rise.

Italy and Germany also experienced a rise in inequality of market income by around 4.5 percentage points each. Both countries experienced small declines in infrastructure expenditures. The rise in schooling in Germany can explain a rise in Gini of market income of 0.03 percentage points, which is much smaller than what we observe. The rise of schooling in Italy can account for close to a rise of 1 percentage point in Gini of market income, which is around a fifth of the rise. Hence, most of the changes in market inequality were due to changes in technology and not a result of public policies.

8. Summary and Conclusions

This paper examines what determines inequality of income in a society, and focuses mainly on public policies as determinants of economic inequality. Our analysis is purely empirical and we use standard cross-country and cross time regressions. We distinguish between inequality of market income and inequality of disposable income and try to examine separately which variables affect each inequality.

Our empirical analysis points very clearly at public policy as a significant determinant of inequality. It plays a major role in redistribution of income from market incomes to disposable incomes, through direct taxation and through social transfers. We also show, by use of instrumental variables, that this effect has a one-way causality. Public expenditures reduce the inequality of disposable income and not the other way around. We only find an effect of inequality of market income on public expenditures, but not of inequality of disposable income.

It is important to note that public expenditures reduce inequality in income due the progressivity of direct taxes and transfers, but they have an even stronger effect on the inequality of utility. Public expenditures consist mainly of public services like education, health, public transportation and housing. These public interventions are important especially for people with low incomes, who would otherwise consume less of these services. Hence, public expenditures not only reduce inequality of income but also reduce inequality in consumption of very important services. Thus, their effect on reducing inequality in welfare is much larger than their effect in redistribution of income.

However, public policy is not only redistributing income from market incomes to personal disposable incomes. Some specific public policies affect the distribution of market incomes as well. One such policy is public education that increases inequality when schooling is relatively low, and reduces it when schooling is higher. Another policy that affects the distribution of market incomes is public hiring. If the government increases its share in the labor market, it increases inequality, as most public sector employees are usually more educated, being teachers, doctors, lawyers, etc. Public investment in infrastructure also reduces inequality as it brings center and periphery closer together. Labor market regulation, which aims at protecting the conditions and wages of the weakest workers in the labor market, also contributes to reducing inequality.

We observe in the last decades a continuous rise in inequality in all developed countries. Economists have given many explanations to this phenomenon, like globalization, skill biased technical change, decline of organized labor and more. This paper suggests that we should also look at the role of governments in this rise of inequality.

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