

Effects of Inequality on Redistribution

An empirical test on Norwegian local governments

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Preface

This thesis has been written as a part of the Master of Economic Theory and Econometrics degree at the University of Oslo.

I would like to start by thanking my supervisor Jon H. Fiva for his excellent help with writing this thesis. His help and patience has been invaluable throughout the process, and I could not have asked for a better thesis supervisor.

I am also very grateful to Camilla Nore for her encouragement, suggestions and proof-reading. This thesis would not have been the same without her help.

All remaining errors and inaccuracies are mine, and mine alone.

Oslo, November 2010.

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Summary

The large variation in the amount of government redistribution in democracies is a much discussed subject in modern economics, and the effect of income inequality on redistribution lies at the core of the debate. Meltzer and Richard (1981) present a model that hypothesizes that there is more redistribution in countries where the income inequality is high, due to the preferences of the median voter. This hypothesis has been tested many times, both on cross-sectional and time-series data, with varying results. This thesis tests the effect of income inequality on redistribution utilizing panel data on Norwegian municipalities, using a fixed effects model,¹ due to the potential problem of omitted variables affecting the results when using cross-sectional data.

The skewness of the income distribution is used to measure the income inequality, and the monthly welfare norm for single-person households, set by the local government in each municipality, is used as the main measure of redistribution. The main finding is that inequality has a small, statistically significant, negative effect on the welfare norm, with the effect being so small that it is not economically significant. A standard deviation decrease in the income inequality measure would not decrease the norm by more than 30 NOK.

Two sample cuts are made to test robustness. The effect of equality reverses after 2001, when a national guideline for welfare payments was introduced. Post-2001, inequality has a positive effect on redistribution, due to the fact that most local governments adapted to the new guideline. This caused governments above the new guideline to reduce their welfare norms, and vice versa. The municipalities are also divided into two groups to see if there are signs of welfare competition affecting the results. This is done by sorting the Norwegian counties by average municipality size, and dividing at the median. The municipalities in the counties where the average municipality size is the lowest make up the “high-pressure” group, where welfare competition is expected to be the strongest. The remaining municipalities make up the “low-pressure” group. The effect of inequality is slightly stronger in the “low-pressure” group, in line with the theory that welfare competition influences the results.

Another measure of redistribution is also used, the average welfare payment per welfare client, made out by local welfare offices. Here the effect of inequality is highly statistically

¹ All regressions are done using STATA 11.

significant and positive, indicating that *ceteris paribus*, there is more redistribution in more unequal municipalities. There are strong concerns about endogeneity with this variable, and taking the previous results found into account, I conclude that the average welfare payment per client does not seem like a suitable measure of redistribution.

Chapter 2 presents the Meltzer-Richard hypothesis, and formalizes it by presenting a textbook version of the model. Chapter 3 presents some previous empirical studies. Chapter 4 presents some institutional settings of the Norwegian municipality system, and discusses how the terms inequality and redistribution are used in the thesis. Chapter 5 presents the econometric specifications used. Chapter 6 presents the results from the main regression, while chapter 7 tests robustness. Chapter 8 concludes.

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1 Introduction

Income redistribution is a much debated issue in today's economics and politics. Some argue that redistribution by the government hampers economic growth due to weakened incentives to work, while others argue that redistribution can promote growth.² The value of income equality is much less debated, even though countries vary greatly in the measures undertaken to create and promote equality. In some parts of the world, e.g. the US or Latin America, wealth redistribution is much less common than in Scandinavia or other parts of Europe. This thesis will not debate if equality and redistribution are to be desired or their impact on economic growth, rather it is the effect of inequality on redistribution that will be analyzed. Is there more income redistribution in places where there are large differences in income, or is redistribution more widespread in the situations where it is needed the least?

Much research has been devoted to the issue and both international and within country differences in inequality has been analyzed, with the empirical literature so far being inconclusive. Acemoglu (2004) suggests that some questions concerning economic systems and policies are impossible to analyze using cross-country data alone, due to the large differences in economic institutions across countries. This thesis heeds this advice, and looks at differences in redistribution between local governments in Norway, as I consider a homogeneous setting with comparable institutions the best way to accurately estimate the effect of inequality. The empirical strategy employed is a fixed effects regression model used on Norwegian panel data. A fixed effects model is useful, since inference will be drawn over time within each municipality, and therefore omitted variables are unlikely to affect the results.

Meltzer and Richard (1981) present a model of the relationship between income inequality and government redistribution that has shaped much of the following research on the subject. Their model proposes that there will be more redistribution in societies with high income inequality, compared to more equal societies. This result is known as the Meltzer-Richard hypothesis. The hypothesis is a result of the fact that the voters in the model who earns less than the mean wage will benefit from more income redistribution, therefore more voters

² Saint Paul and Verdier (1991) present some examples of negative views concerning the effect of redistribution on growth. Alesina and Rodrik (1994) is one example of the opposing view.

below the mean income will lead to more redistribution. Efforts to test the Meltzer-Richard hypothesis empirically has led to mixed results.

Two articles have been written on the subject in the past using Norwegian local governments to analyze the relationship between equality and income redistribution, with conflicting results. Borge and Rattsø (2004) analyze how the income distribution in Norwegian municipalities varies with the level of property tax in the municipality, which they argue is redistributive. They find that the relationship between inequality and redistribution is positive, with a more uneven wage distribution leading to a higher property tax. Fiva and Rattsø (2006) find the opposite relationship, with inequality having a negative effect on the politically decided norm for monthly welfare payments in Norwegian municipalities. This uncertainty partially motivates this thesis.

In section 2 the Meltzer-Richard hypothesis is presented formally through a workhorse model in political economy, and some alternative theories to the Meltzer-Richard hypothesis are briefly presented. Section 3 gives a brief overview of the existing empirical research, with a special focus on the two previous articles using Norwegian data. In contrast to previous research using Norwegian data, this thesis utilizes panel data; where earlier Norwegian studies have mainly relied on cross-sectional variation, this thesis also has time-series variation at hand. Section 4 describes the dataset, and defines the terms equality and redistribution as they will be used in this thesis. All data is provided by Statistics Norway. Some of the institutional settings of the Norwegian local government- and welfare systems are also summarized. Section 5 gives a short explanation of the econometric techniques used, and presents the econometric specifications and empirical strategy. Section 6 gives the results from the main regression. In Section 7 two sample cuts are made, to test the effect of the introduction of a national welfare guideline, and welfare competition. Another measure of redistribution is also used to test robustness, and some extra control variables are added. Section 8 concludes.

2 Theoretical framework

This section presents the Meltzer-Richard hypothesis, and formalizes it by introducing one of the workhorse models in political economy. Some alternative theories to the Meltzer-Richard hypothesis are also briefly presented, although this presentation is far from complete.³

Downs (1957) presents the median voter theorem, which has been important in shaping today's economic research on redistribution and taxation. The theorem proposes that in an election where voters' preferences can be represented along a single dimension, voters will vote for the politician whose policy is closest to their own preferences. In the simplest formulation of the model, there are two parties or politicians competing for power, and the politicians or parties will maximize the number of votes they receive by adapting to the preferences of the median voter, and acting out his policy preference. Who wins the election will be uninteresting, as the policy preference of the median voter will be carried out with either winner. The median voter theorem is a gross simplification, for one due to the assumption of single dimension preferences, but the theorem is popular due to its simplicity, with the simplified election process allowing for study of richer policy problems.

Romer (1975) creates a model with a linear tax-rate determined by majority voting, using the model introduced by Downs. He puts several assumptions on the preferences of the voters to get single-peaked preferences,⁴ so that he can use the median voter theorem. Roberts (1977) uses more general assumptions, and shows that the tax preferences of the agent with the median income will determine the outcome. These two studies differ from previous hypotheses, which mainly focuses on the incentives bureaucrats and politicians have to increase spending and their own control, for their own benefit.⁵

Building on the works by Romer (1975) and Roberts (1977), Meltzer and Richard (1981) present a general equilibrium model of a labor economy, where the size of government is measured by the share of income redistributed. This income share is decided by majority voting as in Romer (1975) and Roberts (1977), and voters now take other voters labor-leisure choices into consideration when voting, e.g. an increased tax rate gives negative incentives to work and save.

³ See Lind (2005) for a more complete survey on alternative theories to the Meltzer-Richard hypothesis.

⁴ Preferences where outcomes are preferred less, the further away they are from an agent's ideal choice.

⁵ See Larkey et al (1980) for a review.

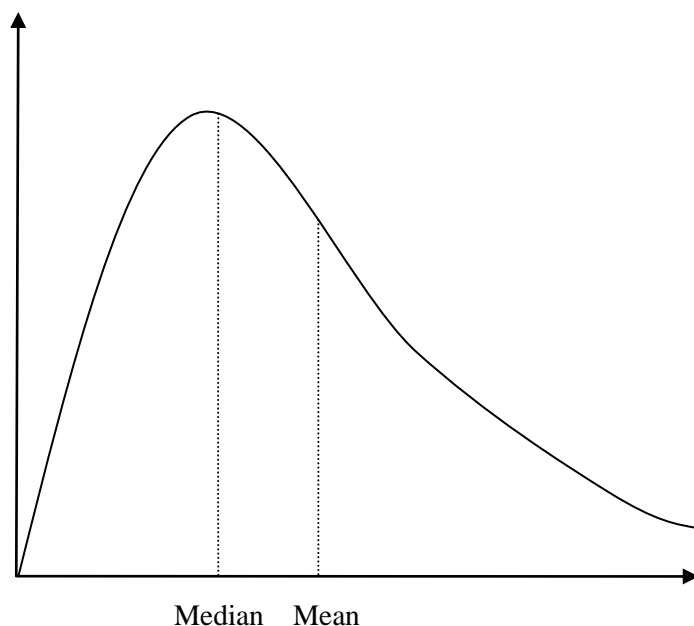


Figure 2.1: a right-skewed income distribution, with the mean above the median.

Greater distance between the mean and the median indicates a more unequal distribution.

Figure 2.1, is an example of a right-skewed income distribution, which empirical studies have shown to be an accurate description of most income distributions (Meltzer and Richard, 1983). In right-skewed income distributions the mean is higher than the median, as there are a small number of people whose income is much higher than the rest. Since most income distributions are skewed to the right as in figure 1.1, an increase in mean income relative to the income of the decisive voter increases the size of government, meaning that *ceteris paribus*, we should expect to see more redistribution in unequal societies compared to more equal ones. As mentioned, this result is known as the Meltzer-Richard hypothesis. Meltzer and Richard point to the extension of the franchise in the nineteenth- and twentieth century as a major reason for government growth in modern times, as this introduced a large number of voters with a relatively low income (lower than the mean) into the electoral systems.

To formalize the hypothesis presented by Meltzer and Richard (1981), I present a model with the same assumptions and results as the one proposed in Meltzer and Richard (1981), taken from Persson and Tabellini (2000, p 118). In the model there are two political parties competing to win an election, with voters voting over the tax rate. The voter mass is normalized to one, with voters looking to maximize their utility over two goods, consumption of a normal good and their leisure time. The political parties are trying to win the election. The preferences of voter i are:

$$w_i = c_i + V(x_i) \quad (2.1)$$

where c denotes consumption and x denotes leisure. $V(\cdot)$ is the concave utility function of the voters. The private budget constraint is

$$c_i \leq (1 - \tau)l_i + f \quad (2.2)$$

where τ is the income tax-rate, l_i is individual labor supply and f a lump sum transfer from the government. The model assumes that some individuals are more productive than others, and this is modeled by some voters having more time than others, with the time constraint each individual faces being

$$1 + e_i \geq x_i + l_i \quad (2.3)$$

where e captures individual productivity, with more productive individuals having more time that can be spent on either work or leisure. e_i is distributed with a median, e^m , and a mean, \bar{e} , with the distribution of e being skewed to the right, meaning that $e^m < \bar{e}$ as in figure 2.1. The workers solve the maximization problem

$$\max (1 - \tau)(1 + e_i - x_i) + V(x_i) + f \text{ with regards to } x_i \quad (2.4)$$

where equation (2.3) has been solved for l_i and has been inserted into (2.4).

The solution gives us optimal labor supply, which is given by the following expression

$$l_i = L(\tau) + (e_i - \bar{e}) \quad (2.5)$$

with

$$L(\tau) \equiv 1 + e - \frac{dV^{-1}(1 - \tau)}{dx}$$

$L(\tau)$ is decreasing in τ , and thus a higher tax rate leads to the workers working less. The average of e_i is \bar{e} , so average labor supply is given by (2.5) and is equal to $l_i = L(\tau)$. The government budget constraint can therefore be written

$$f \leq \tau l \equiv \tau L(\tau) \quad (2.6)$$

$W(\tau)$ is the voters' indirect utility function, that gives voter i 's preference over τ , as

$$\begin{aligned}
W_i(\tau) &\equiv (1 - \tau)l_i + f + V(x_i) \\
&\equiv (1 - \tau)(L(\tau) + (e_i - \bar{e})) + \tau L(\tau) + V(1 - L(\tau) + \bar{e})
\end{aligned} \tag{2.7}$$

where it has been inserted for l_i , f and x_i from (2.3), (2.5) and (2.2) respectively. Maximizing equation (2.6) with regards to τ gives

$$\frac{dW_i(\tau)}{d\tau} = -(e_i - \bar{e}) + \tau \frac{dL(\tau)}{d\tau} = 0 \tag{2.8}$$

Solving for τ gives

$$\tau_i = \frac{e_i - \bar{e}}{\frac{dL(\tau)}{d\tau}} \tag{2.9}$$

As $\frac{dL(\tau)}{d\tau} < 0$, (2.9) implies that a unproductive voter ($e_i < \bar{e}$) prefers a positive tax rate, while a rich voter will prefer an income subsidy ($\tau < 0$) financed by a lump sum tax.

$$\tau_m = \frac{e^m - \bar{e}}{\frac{dL(\tau_m)}{d\tau}} \tag{2.10}$$

(2.10) shows that if the productivity of the median voter increases, the distance between the median and mean productivity will go down, and the median voter will prefer a lower tax rate. This tax rate will be implemented as the median voter theorem applies, and the candidates from both political parties will commit to the tax rate preferred by the median voter, τ_m . If a candidate committed to another tax rate, the other candidate would win by committing to a tax rate closer to the one preferred by the median voter. Therefore, a less productive median voter (with unchanged mean productivity) or higher mean productivity (with an unchanged median voter) would lead to more redistribution, i.e. the Meltzer-Richard hypothesis.

Several alternative models have been proposed as a counter to the Meltzer-Richard hypothesis, many proposing that the more income equality will lead to more redistribution, not less. Benabou (2000) presents a model where the decisive voter is richer than the median voter,⁶ due to people's propensity to vote and participate in political activities is increasing with income and education. The model proposes that when credit and insurance markets are imperfect, a variety of policies that redistribute wealth from the rich to the poor can have a positive net effect on aggregate output, thereby creating more welfare. Examples of such

⁶ But not necessarily richer than the mean voter.

policies include social insurance through taxes and transfers and publicly funded education. These types of policies are more popular in societies with little inequality, while in unequal societies there will be increased inequality in the future, due to less support for redistribution now. The relationship between inequality and redistribution is therefore U-shaped, with two stable steady states. One is a state where there is high inequality and low redistribution, in the other there is low inequality and high redistribution. Due to the similar size and structure of Norwegian municipalities, the model is not very relevant for analyzing differences in redistribution within Norway.

Moene and Wallerstein (2001) emphasize the insurance aspect of state welfare policies. In their model different groups of the population have different incomes, and face different risks regarding future income, with a share of the population being completely outside the labor market. Government spending is characterized by a tax rate that determines spending, and a distributive parameter that determines how welfare spending is targeted. They show that equality's effect on welfare spending is dependent on where the spending is targeted. When spending is targeted towards the employed, greater inequality, like a situation where the median wage decreases while the mean wage stays constant, increases the support for redistribution. When spending is targeted towards those outside the labor market, inequality reduces the support for redistribution.

Acemoglu and Robinson (2001) try to explain why much of the redistribution carried out is inefficient. They present a model where the political influence of a group depends on its size, as political systems cannot credibly commit to future policies, as they are dependent on who's in power. Inefficient redistribution, such as price subsidies or certain labor market regulations, is therefore used as a tool to sustain political power, as this redistribution makes it marginally more attractive to stay within a group. Their model explains many of the redistribution policies used in the agricultural sector, in labor markets and in international trade. They find that inefficient redistribution is more prevalent when production factors are less specific to a sector.

Barth and Moene (2010) explore how equality can multiply due to the complementarity between wage determination and welfare spending. They argue that there are two effects in play:

- i) The equality magnifying effect: more equal wages will lead to voters becoming more similar in their welfare state demands. Most people will demand more social insurance when their income increases, so a more equal income distribution will lead to a larger welfare state.
- ii) The wage equalizing effect: a more generous welfare state will lead to less income inequality, as the difference between high- and low income earners goes down with higher welfare benefits.

Together these two effects create a multiplying effect, as increased equality will lead to more welfare spending, which in turn will lead to more equality and so on. They name this effect “the equality multiplier”. They test this theory empirically, both by looking at international and U.S. data, and find support for their model.

3 Empirical background

Meltzer and Richard (1983) tests their hypothesis stated in Meltzer and Richard (1981) empirically, using time-series data from the United States from 1937 to 1977, (excluding 1940-1945), checking the relationship between government spending and the ratio of mean to median income. Their analysis rests on the assumption that government spending is a good measure for redistribution. They find support for their hypothesis, although they only test the United States and are unable to capture year-fixed effects.

Gouveia and Masia (1996) test the Meltzer-Richard hypothesis using panel data on US states, from 1979 to 1991. Instead of using government size as a measure of redistribution like Meltzer and Richard (1981), they test if percent of government income devoted to redistribution grows when inequality grows. A variety of econometric techniques is used, including a fixed-effects regression model. They fail to find support for the original model proposed by Meltzer and Richard, and some of their findings go in the opposite direction.

Milanovic (2000) tests the Meltzer-Richard hypothesis using a fixed effects model, with data from the Luxembourg Income Study (LIS) on 24 countries, with 79 observations in all. He argues that previous studies on the subject have been seriously flawed, due to the lack of proper data on income before taxes and transfers, which he calls factor-income, in the past. He finds strong support for the Meltzer-Richard hypothesis, with the poor in countries with

more inequality “catching up” to the poor in countries with less unequal factor-incomes. This effect is reduced when pensions are treated as a part of the factor-income. When pensions are excluded, Milanovic finds that the middle-class does not gain from redistribution, while the situation is more unclear when pensions are included. Due to this, the paper concludes that the median voter hypothesis fails to explain redistributive transfers.

Iversen and Soskice (2006) point to how the Meltzer-Richard hypothesis has failed to explain much of the variance in redistribution among democracies, and present a general model of redistribution. Their main focus is on a country’s election system; their model predicts that in countries with a proportional representation system, centre-left governments will be more prevalent, and there will be more redistribution, compared to countries with majoritarian election systems. They test their model on LIS data on 14 democracies, with observations ranging from the late sixties to the late nineties. Their panel is unbalanced with a total of 61 observations, with some countries having as little as two observations. They find that inequality has a negative effect on redistribution when political and institutional variables are not controlled for, contrary to the model in Meltzer and Richard (1981). The effect is both statistically and economically significant, with a standard deviation’s increase in inequality leading to a 0,3 standard deviation reduction in redistribution. However, this effect disappears when controlling for political and institutional variables and no statistically significant effects are found.

Ramcharan (2010) tests the relationship between economic inequality and redistributive policies in U.S. counties, using data from 1890 to 1930. County-level data is used as redistributive policies were mostly decided by local governments during the time period, and the analysis is restricted to within-state variation to reduce the potential impact of omitted variables, such as institutional and political variables. Several approaches are utilized, with both OLS and instrumental variable strategies used to contrast results. Both per capita tax revenue and per capita education expenditure is used as measures of redistribution. The results point to a negative correlation between economic inequality and redistribution, with the results from the instrumental variable regressions being consistently larger than the OLS results. The results are both statistically and economically significant, with a standard deviation increase in inequality being associated with an 18% percent decline in per capita education spending, and a 9% or 23% decrease in the government per capita tax revenue, depending on the year.

Borge and Rattsø (2004) is the first article to test the Meltzer-Richard hypothesis on Norwegian local governments, using a panel dataset from 1996 to 1998. Although a panel dataset is used, there is substantially more cross-sectional variation than time-series variation, due to the short time span. The effect of income distribution on the local governments' choice of tax structure is estimated, with local governments choosing between user charges related to housing related utility services, called a poll tax by the authors, and a property tax. They assume that the property tax is redistributive, citing the conclusion of a government commission that finds that the property tax is roughly proportional to household income. An instrumental variable approach is used to deal with the potential endogeneity problem of background factors such as industrial organization deciding the income distribution. The results support the Meltzer-Richard hypothesis, as they find that a more equal income distribution shifts some of the tax burden from the property tax to the poll tax, reducing the degree of income distribution in the tax system. A weakness of the study is that the taxes' make up a fairly small part of the local governments' budget; the property tax generates 2% of the local governments' revenue, the poll tax 8%. The Norwegian local government system does not allow the local governments much discretion in collecting revenue, and it is generally thought that local governments in Norway redistribute more through transfers using grants from the central government, than through tax collection.

The second article using Norwegian data, by Fiva and Rattsø (2006), set out to evaluate the importance of welfare competition in Norwegian local governments, using an instrumental variable approach on cross-sectional data from 1998. While the article's main focus is not the effect of income inequality on redistribution, the municipalities' income distribution is included as a control variable. They separate the expected welfare payments from the municipalities' welfare norms decided politically (described in greater detail in chapter 4), and find that inequality has a negative impact on the welfare norm set by local politicians, going against the Meltzer-Richard hypothesis. They do not find any statistically significant effect of equality on expected welfare payments.

4 Data and institutional setting

The number of Norwegian local governments has gradually decreased since their conception in 1837, and varies in the dataset used from 440 in 1993 to 430 in 2008. Norwegian local governments are well suited for testing the relationship between inequality and government

redistribution, due to their similar size and structure. The local governments get most of their income from grants from the central government and have limited options to attain more revenue, but have a large degree of freedom in deciding how to use their income, even though they face some regulations concerning the coverage and standard of services they provide. Their main welfare responsibilities are child care, primary education and elderly care; on average these items account for roughly 45 percent of the municipalities spending (Fiva and Natvik, 2010).

4.1 Inequality

The main purpose of this thesis is to test the effect of income inequality on the level of redistribution, and it is therefore important to define how the terms inequality and redistribution will be used. To measure the wage inequality I will use the ratio of median- to mean gross income, which captures the skewness of the wage distribution:

$$\frac{\text{median income}}{\text{mean income}} = \text{equality} \quad (4.1)$$

This ratio is the same measure used originally by Meltzer and Richard (1981), and effectively captures the level of wage equality, not inequality, as a higher number means more equality. For a given mean, an increased median means a more even wage distribution. Income is defined as wage-, capital- and business income, plus pensions, for people aged 17 and above in the municipalities. As described in section 2, most wage distributions are skewed to the right (Meltzer and Richard, 1983), with the mean being higher than the median.

Table 4.1: summary statistics for mean- and median income and equality. Mean- and median wage in 2008 NOK.

Variable	Mean	Std. Dev.	Min	Max	N
mean	244972	47390	148601	702986	6915
median	216045	40420	127819	360800	6915
equality	0,8835	0,0469	0,3917	1,020612	6915

Table 4.1 presents summary statistics for the mean- and median gross wage in the municipalities, as well as for the equality measure. We see that the mean value for the mean wage is above the mean value for the median wage.

The equality measure of the median/mean ratio has known flaws (Borge and Rattsø, 2004),⁷ as an example consider an increase in low-level wages below the mean, with an unchanged median wage. This would reduce income inequality, as the distance between the top and bottom earners would be reduced, but the increased low-level wages would increase the mean, reducing the median to mean ratio, indicating increased inequality. Despite this, the median to mean ratio is the best measure of equality available, and it is the most frequent measure of income inequality in related literature (e.g. Borge and Rattsø (2004), Fiva and Rattsø (2006), Meltzer and Richard (1981)).

Table 4.2 is a table of summary statistics for the mean gross income measured in 2008 NOK, by year. We see that the mean wage has steadily increased from 1993 to 2008, with the total change being approximately 12 000 NOK.

Table 4.2: summary statistics for mean gross income, measured in 2008 NOK, by year.

Year	Mean	Std. Dev.	Min	Max	N
1993	191789	21449	148601	298424	432
1994	194324	22041	152445	304756	433
1995	197735	22341	154339	305018	433
1996	206483	24027	162857	321968	433
1997	214073	26890	162240	359597	433
1998	227359	26565	173030	355911	433
1999	235746	30976	176619	486877	433
2000	243970	30959	181574	411957	433
2001	247109	27946	186940	386804	433
2002	260466	30901	199776	420929	434
2003	260367	32353	193689	421007	434
2004	267144	32792	201958	436433	433
2005	286651	46462	209783	702986	429
2006	276114	29603	216386	426389	430
2007	300454	32873	236558	470936	429
2008	311138	32929	242700	478200	430

⁷ Another measure of income equality would have been nice to test robustness, like a measure of some sort involving deciles or quantiles, but such data does not exist on a municipality level for Norway. Borge and Rattsø (2004) use the gap between the 75% and 25% fractiles as an alternative measure of inequality, while Barth and Moene (2010) use the ratio of the 9th to 1st deciles of gross income as their main measure of inequality.

4.2 Redistribution

In Norway, providing welfare benefits is a local responsibility. The Social Services Act set restrictions and guidelines for the implementation of these services, but also leaves discretion to the local governments concerning the generosity of the system. In this thesis the redistribution perspective is confined to social welfare support, from the general population to people receiving welfare benefits, such as the long-term unemployed. The group receiving this kind of support is fairly small, in 2007 and 2008 2,3% of the population received this type of support (Grebbsstad and Holm, 2009). It is important to keep this in mind throughout the thesis, as this is just one way of approaching the issue, and several models predict that inequality will have differing impacts on redistribution, depending on the form and targeting of the redistribution. In the context of the model presented by Moene and Wallerstein (2001), the group receiving welfare benefits would represent the agents outside the labor market.

Table 4.3: summary statistics for the politically decided welfare norm per month, nominal NOK, single-person households.

Year	Mean	Std. Dev.	cv ⁸	Min	Median	Max	N
1995	3621	523	0,14	1900	3660	5281	430
1996	3711	524	0,14	1900	3698,5	5520	430
1997	3808	556	0,15	2102	3800	5722	429
1998	3969	605	0,15	2258	3932,5	6441	430
1999	4043	612	0,15	2484	4002,5	5964	430
2000	4118	623	0,15	2600	4068	6969	430
2001	4119	542	0,13	2760	3950	7291	430
2002	4174	466	0,11	2760	4000	6140	430
2003	4163	434	0,10	3000	4000	5948	430
2004	4202	386	0,09	3000	4140	6120	430
2005	4220	442	0,10	2140	4140	8600	433
2006	4327	395	0,09	3120	4270	9434	428
2007	4585	371	0,08	3000	4600	10022	431
2008	4739	357	0,08	3500	4720	10022	420

The local council in each municipality sets a guideline for welfare payments to a standardized user, while the actual payments are done independently by the local welfare office. The main focus in this thesis is to see how inequality affects this politically decided norm set by the local government. As seen in table 4.3 there are differences in the level of support, both over

⁸ Coefficient of variation, calculated by dividing the standard deviation by the mean.

time and between municipalities, although this variation is much smaller than the variation in income seen in table 4.2. The welfare norm include different things in different municipalities, some norms cover living expenses, dental costs and such, while this is not included other places. This is not a big problem in this thesis, as only variation *within* each municipality is analyzed. One would expect this politically decided norm to capture the preferences of the politicians, and the strategic choice they make when setting the norm, knowing what policies the bureaucrats have implemented in the past.

Figure 4.1 is a scatter plot depicting the relationship between the measure of equality and the politically decided welfare norm in each municipality in 2000. More equality is associated with a higher welfare norm in the figure.

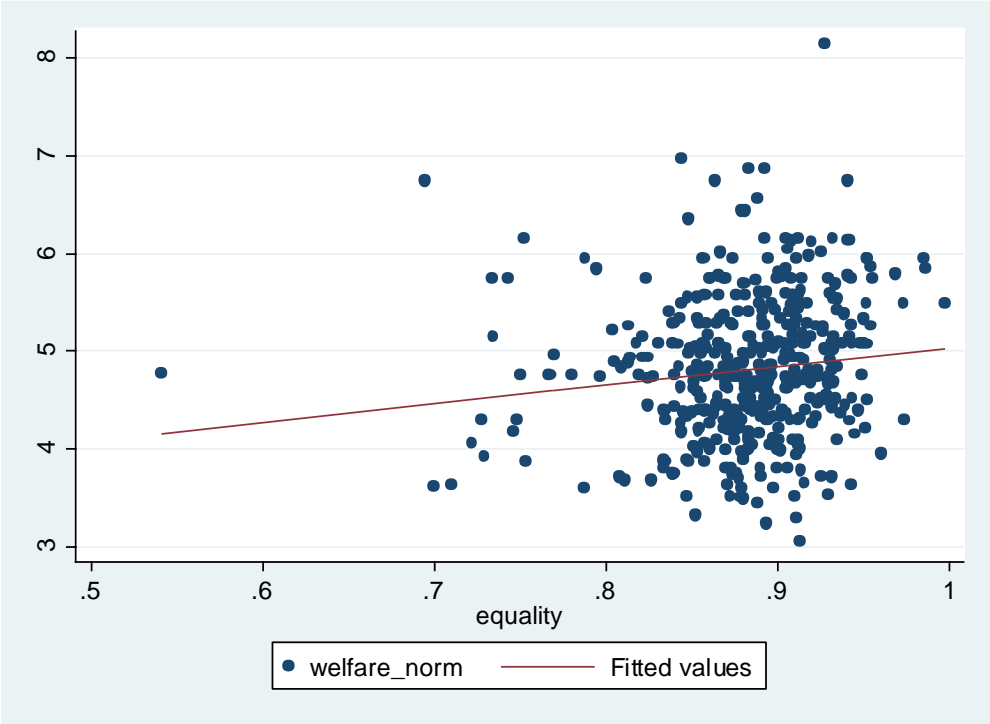


Figure 4.1: relationship between median/mean ratio and welfare norm measured in 2008 NOK, all municipalities, year 2000.

Equality equals gross median income divided by gross mean income, for persons aged 17 and above, with pensions included. Welfare norm is the politically decided monthly welfare norm for single-person households, measured in 1000 NOK.

In 2001 national guidelines for social security benefits were introduced, to standardize the level of benefits provided in the municipalities. Fiva (2009) find that the introduction of the national guideline had a large impact on municipalities’ welfare norms, with 119 municipalities immediately implementing the exact national guideline. We see in table 4.3

that the coefficient of variation has decreased and the mean has stayed close to the national guideline, confirming this finding.

Table 4.4: national guideline for monthly welfare payments to single-person households.

Year	2001	2002	2003	2004	2005	2006	2007	2008
National guideline for single-person households in nominal NOK	3880	4000	4000	4140	4140	4270	4600	4720
National guideline for single-person households in constant 2008 NOK	4308	4478	4367	4502	4431	4468	4775	4720

Table 4.4 shows the development of the national guideline since it was introduced in 2001, both in nominal and constant NOK. We see that from 2001 to 2008 the guideline has increased by more than 400 constant NOK. Figure 4.3 shows the development of the mean welfare norm, national guideline and mean wage for all municipalities in 2008 NOK. We see that the welfare norm has been more or less constant from 1993 to 2008. This is in contrast to the mean wage, which has grown almost every year, as we also saw in table 4.2.

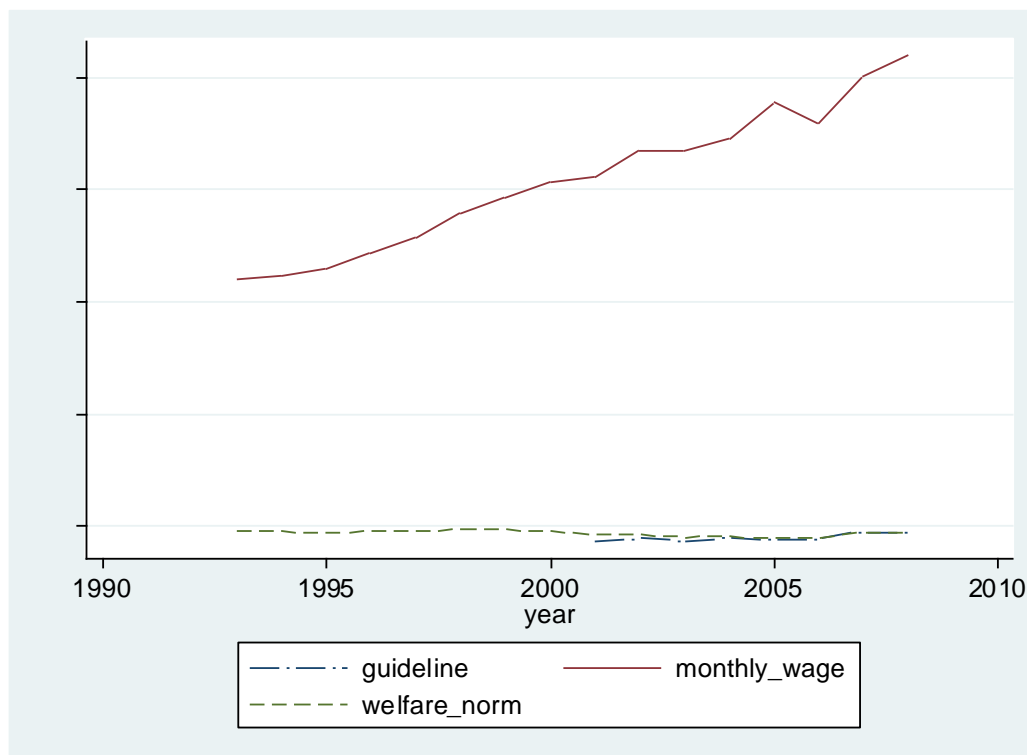


Figure 4.3: development of the mean monthly welfare norm, mean monthly national guideline for single-person households and monthly gross mean wage, for all municipalities, measured in 2008 NOK, 1993-2008.

Gross mean wage is wage, capital and business income, plus pensions, for all individuals older than 17.

4.3 Robustness

In section 7, two sample cuts are made to test robustness. First, the observations are split into groups pre- and post 2001, to check how the introduction of a national guideline has affected the results. Judging from previous studies and table 4.3, we would expect equality to have more of an impact on redistribution before the introduction of the national guidelines, since local governments seem to have adjusted to the national guidelines, and therefore had more freedom when deciding their welfare policy before it was introduced.

Wildasin (1991) present a model where several local or national entities (e.g. municipalities, counties, countries) share a common labor market, with workers who are mobile between the entities. The model hypothesizes that when an area increases its welfare benefits, it will receive an influx of welfare recipients, further increasing the costs of having more generous welfare benefits. Fiva and Rattsø (2006) conclude that there is a geographic pattern in Norwegian welfare benefits, and find that welfare competition has a significant effect on the welfare norm in Norwegian municipalities.

To see if there are signs of welfare competition in the data, municipalities are divided into two. Counties are sorted by average municipality size, and divided into two at the median.⁹ Municipalities in the counties with the lowest average size make up the “high pressure” group,¹⁰ where one might expect that inequality has less of an impact on redistribution, as municipalities will be more affected by the redistribution level in surrounding municipalities. If the local government opted for a more generous welfare scheme, one would think that the municipalities in the “high pressure” group would be more vulnerable to receiving large influxes of welfare clients from surrounding municipalities, due to the smaller distances between municipalities in these counties. If this is correct, the “low-pressure” group would be better suited for testing the relationship between equality and redistribution, as municipalities in this group would have more discretion when deciding their welfare policy.

Figure 4.4 shows how the development of the mean welfare norm has been in the “high-pressure” and “low-pressure” groups, from 1993 to 2008. We see that the welfare norm in the “low-pressure” group is above the welfare norm in the “high-pressure” group for the entire period, although the difference starts getting smaller in 2001, when the national welfare guidelines were introduced. In 2008 the mean for the two groups are roughly equal. The difference between the two groups further motivates the need to test for welfare competition.

⁹ Municipality sizes were not available for the entire time period, so size in 2008 is used as a measure for municipality size. There has been little variation in municipality sizes in the time period, so this is unproblematic.

¹⁰ The group with municipalities in counties with below-median average municipality size consists of the municipalities in Akershus, Østfold, Vestfold, Rogaland, Hordaland, Buskerud, Møre og Romsdal, Vest-Agder, Aust-Agder and Oslo municipality. Municipalities from the remaining counties make up the other group.



Figure 4.4: development of the monthly welfare norm to single-households for municipalities in the “high-pressure” and “low-pressure” groups and the national welfare guideline, measured in 2008 NOK, 1993-2008.

The “high-pressure” group consists of municipalities in counties with the average municipality size below the national median. The “low-pressure” group consists of the remaining municipalities. The national welfare guideline is the monthly guideline for welfare support to single-person households.

Also in section 7 an alternative measure of redistribution is introduced, with the average monthly welfare payment per client being used as a separate measure of redistribution, as an extension to main regression specifications. This variable captures the actual welfare payments to the recipients, carried out by the local welfare offices in each municipality, in contrast to the welfare norms decided by each local government. It is interesting to check the relationship between equality and the welfare norm, to see if the relationship found between equality and the politically decided welfare norm carries over into the actual welfare payments. However, there are potentially serious problems with this measure of redistribution, as it does not take into account the number- or the diversity of welfare clients in each municipality, and may therefore not reflect the generosity of each local government, as welfare clients are a very heterogeneous group. Welfare clients in one municipality could potentially have much differing needs and costs compared to welfare clients in another municipality.

5 Econometric specification

Where similar studies have relied mainly on cross-sectional variation, the data set used in this thesis also offers time-series variation, with data being available from 1993 to 2008. The main model used is a fixed effects regression model. A fixed effects model creates a dummy variable for each entity we are measuring the fixed effect of, in this thesis Norwegian municipalities, and omits the standard intercept. Ordinary least squares (OLS henceforth) is then run on the data, including these dummies. This allows each municipality to have its own intercept, but all municipalities have the same slope. The main equation is:

$$welfare_norm_{it} = \gamma_i + \beta equality_{it} + \delta income_{it} + \lambda X_{it} + \xi_t + \epsilon_{it} \quad (5.1)$$

where i denotes the municipality and t denotes the year. $welfare_norm_{it}$ is the politically decided welfare benefit norm for a single-person household in municipality i , measured in 1000 NOK. $Equality_{it}$ is the gross median income over gross mean income in municipality i , and β is its effect on the benefit norm and the main coefficient of interest. X is a vector of control variables and λ is a vector of coefficients. γ_i is the municipality fixed effect in local government i , and time fixed effects, ξ_t , are also included. ϵ_{it} is the error term. Control variables are added in steps, as some of the variables could be endogenous and we are interested in seeing how the added variables affect the results.

It is assumed that

$$E(\epsilon_{it} | \gamma_i, X_{it}, equality_{it}, \xi_t) = 0 \quad (5.2)$$

meaning that the residual terms are uncorrelated with the regressors, which is the standard OLS assumption. The municipalities' intercepts can vary from year to year due to the time fixed effects, but the yearly effect is equal for all municipalities. All regressions will also include the control variable $income$, which is average gross income in each municipality, measured in 1000 NOK. Wheaton (2000) proposes that all else equal, local governments with greater taxpayer income will have higher welfare levels and a greater share of welfare recipients among its residents, as redistribution is motivated by altruism. This effect is not the interesting effect in this thesis, but it is important to control for as it is likely to have an impact on the dependent variable. Both $welfare_norm$ and $income$ are measured in 2008 NOK.

A fixed effects model only measures the variation within each municipality, as all cross-sectional variation between municipalities are assigned to the municipality specific dummy γ_i . This means that much of the variation within the sample is lost, as only the variation within each municipality is measured. Therefore, the fixed effect estimator is sometimes called the within estimator. A certain amount of degrees of freedom are lost, equal to the number of dummy variables implicitly created to measure the fixed effects minus one, due to each municipality having its own intercept. The reward of using a fixed effects model is a reduced risk of omitted variable bias, that could potentially assign variation belonging to excluded variables to the main coefficient of interest, β . In section 6 the results from fixed effects regression will be compared to OLS results.

The fixed effects model does not explain the causal relationship between equality and redistribution, and reverse causality could potentially be an issue when estimating the relationship. In general, determining the causal relationship between equality and redistribution is not straight forward, as far-reaching redistributive policies such as taxes and education-spending could affect the degree of income equality. An instrumental variable approach could be used to overcome this, as in Ramcharan (2010). Since the redistribution measure in this thesis is narrow, I judge the issue with reverse causality to be insignificant, as it is unlikely that benefits received by a small number of population will have a significant impact of the income distribution for the whole population.

The baseline model includes equality and income as the only explanatory variables, together with municipality- and time fixed effects:

$$welfare_norm_{it} = \gamma_i + \beta equality_{it} + \delta income_{it} + \xi_t + \epsilon_{it} \quad (5.3)$$

For reasons mentioned previously, it would not make sense to exclude the time fixed effects even in the baseline model.

The first control variables added are demographic variables, which are likely to affect the demand for social security in the municipality and the level of equality, as people of different ages tend to have different demand for social services. Grebbstad and Holm (2009) find that the average age of social welfare recipients is lower than the average of the general population. The variables *age06* and *age715* is the percentage of the population that are ages zero to six and seven to 15, while the variable *elderly* is the percentage of the population 66

and older. The variable *pop1000* is the municipalities' total population measured in 1000 people, which is included because welfare recipients in populous municipalities generally receive higher welfare transfers. The average welfare payments in municipalities with less than 50 000 inhabitants is 555 NOK, compared to 1223 NOK in municipalities with more than 50 000 people (Grebbstad and Holm, 2009). A worry when adding the demographic control variables is Tiebout sorting, meaning that households would be sorted between the different municipalities, in order of their preferences for welfare services. This would lead to the demographic variables being endogenous, as age groups that on average has a higher demand for welfare services would be more represented in municipalities with a high welfare norm.

The next control variable to be added is a variable capturing the proportion of votes going to parties on the left side of the political spectrum, *voteshare left*. Parties on the left side are generally thought to have a greater wish for redistribution and an increased support for social security. It is not apparent that this is a good control as also this variable could be endogenous, with increased equality leading to more votes for parties on the left wing, leading to more redistribution. Still, it is interesting to see how the variable will affect the results. A study of Norwegian municipalities (Fiva, 2009), finds that welfare policy does affect residential choices of welfare recipients. For this reason, characteristics such as unemployment and higher education are not included in the main econometric specification, as they could potentially be endogenous. They are however included in section 7.4, to see their effect. Table 5.1 present summary statistics for both of the dependent variables and all controls.

Table 5.1: Summary statistics for the monthly welfare norm, monthly average support per welfare recipient and all control variables. Welfare_norm, supportpercase and income in 1000, 2008 NOK.

Variable	Mean	Std. Dev.	Min	Max	N
welfare_norm	4,716	0,62	2,29	10,402	6854
supportpercase	25,758	9,44	0	70,980	5202
equality	0,8835	0,0469	0,3917	1,0210	6915
income	244,972	47,390	148,601	702,986	6915
pop1000	10,351	29,761	0,209	560,484	6946
age06	0,089	0,013	0,042	0,148	6946
age715	0,121	0,014	0,074	0,189	6946
elderly	0,164	0,037	0,066	0,322	6946
votesh~_left	0,378	0,141	0	1	6938
edupercent	0,018	0,013	0,002	0,120	6923
unemployment	0,029	0,015	0	0,130	6942

At the start of section 6 the similar study from Fiva and Rattsø (2006) is replicated. Since this study is purely cross-sectional, OLS is used to estimate the equation:

$$welfare_norm_i = c_0 + \beta equality_i + \lambda X_i + \epsilon_i \quad (5.4)$$

where $welfare_norm_i$ is the politically decided welfare benefit norm per month measured in 1000 NOK for municipality i , c_0 is the constant term, $equality$ is the measure of the income distribution which is the median over mean wage ratio for municipality i , X_t is a vector of controls for municipality i , and ϵ_i is the error term. The vector of controls includes the average gross income for persons 17 and over measured in 1000 NOK, the natural logarithm of the municipalities' population, demographic variables measuring the amount of persons between zero and five, six to 15 and over 67 years of age, and the amount of votes going to parties belonging to the left-wing of Norwegian politics. The regression in section 6 is not an exact replica of the previous study, as the variables g , which is lump-sum grants from the central government and the local government's tax-income per capita, sqm price, which is the average municipal housing price per square meter, and the dummy housing, that measures if support to housing is included in the dependent variable, are included in Fiva and Rattsø (2006), but not in my regression.

6 Results

I start by replicating the similar study found in Fiva and Rattsø (2006), to test that the same results are found.¹¹ Table 6.1 is a cross-sectional regression similar to the one in Fiva and Rattsø for 1998, with the welfare benefit norm per month for single-person households measured in 1000 NOK as the dependent variable. The results in table 6.1 are very similar to the ones found by Fiva and Rattsø, but equality has a stronger impact on the welfare norm in my regression. Equality has positive and statistically significant effect on the politically decided welfare norm in both regressions, with the equality coefficient below, 2,83, being higher than the coefficient found by Fiva and Rattsø, 1,91. This is not a large difference economically; an increase in the equality variable of one standard deviation would result in an increase in the welfare norm of 141 NOK using the results from table 6.1, compared to an increase of 96 NOK using the results found by Fiva and Rattsø.

Table 6.1: OLS regression for 1998. Welfare norm and income measured in 1000 NOK.

VARIABLES	(1) welfare_norm
income	0.00390 (0.0270)
equality	2.825*** (0.787)
logn	-0.0941*** (0.0347)
age06	8.621** (3.345)
age715	6.125** (2.828)
elderly	4.666*** (1.465)
voteshare_left	0.0332 (0.252)
Observations	429
R-squared	0.116

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

To test the results found by Fiva and Rattsø (2006) we will see if the results hold up when a fixed effects model is used and time-series variation is added. It could be that cross-sectional

¹¹ Control variables are not added one by one as described in the previous chapter, as this is not done in Fiva and Rattsø (2006).

analysis fails to take local government and municipality specific differences into account, and therefore suffers from omitted variable bias. Again using the welfare benefit norm per month for single-person households measured in 1000 NOK as the dependent variable, but now covering the years from 1993 to 2008, specification (1) is the baseline model which controls for year- and local government fixed effects and the average gross income in the municipalities. Specification (2) also includes demographic variables, and specification (3) includes the control variables from (2) plus the variable *voteshare left*, which is the percentage of votes going to left-wing parties. We see in table 6.2 that the effect of equality is positive and not statistically significant in specification (1) and positive and statistically significant in specification (2) and (3) at the 10% level.

Table 6.2: fixed effects regression, 1993 -2008. Welfare_norm and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) welfare_norm	(2) welfare_norm	(3) welfare_norm
equality	0.105 (0.324)	0.557* (0.337)	0.561* (0.338)
income	0.00155** (0.000740)	0.00201*** (0.000772)	0.00201*** (0.000773)
pop1000		0.0216*** (0.00390)	0.0214*** (0.00391)
age06		0.896 (1.034)	0.893 (1.035)
age715		0.249 (0.901)	0.230 (0.902)
elderly		3.940*** (0.767)	3.935*** (0.769)
voteshare_left			0.0254 (0.108)
Observations	6,838	6,838	6,830
R-squared	0.068	0.075	0.075
Municipalities	436	436	436

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results of the equality coefficients becoming more positive and statistically significant when adding more controls is interesting, and shows that the demographic controls has a large influence on the results, with the municipality population and the proportion of people over 66 years old both statistically significant at the one percent level. The control *voteshare_left* is not statistically significant and does not have much influence on the results in specification

(3). The results in (2) and (3) partially validate the findings in Fiva and Rattsø (2006) and do not support the Meltzer-Richard hypothesis, as inequality is shown to have a negative effect on the welfare norm. However, the economic significance of equality on the welfare norm is very small. A standard deviation increase in the equality variable would lead to a 5 NOK increase under specification (1), and a 26 NOK increase in specification (2) and (3), hardly a substantial effect.

These results indicate that the level of wage equality in each municipality does not have much effect on the municipalities' welfare benefits. The little impact there is, is positive and statistically significant when including all control variables, with more equal municipalities having higher levels of welfare benefits. This goes against the Meltzer-Richard hypothesis and the findings of Borge and Rattsø (2004), and confirms relationship between equality and the politically decided welfare norm found in Fiva and Rattsø (2006). However, the effect found in table 6.2 is significantly weaker than the effect in Fiva and Rattsø (2006). The R^2 in the regression is very low, indicating that the model explains little of the variation *within* each municipality.

We see in table 6.2 that the coefficient for the average gross income has economic significance, with a standard deviation increase in income leading to a 0,8 standard deviation increase in the welfare norm. This effect is in agreement with Wheaton (2000), who proposes that higher income levels are associated with more redistribution. The result goes against Gramlich and Laren (1984) who argue that this relationship is negative, due to the motive for income security. They argue that voters are more likely to be in favor of welfare benefits if they feel they might need them one day, and those voters who feel uncertainty about their own income might emphasize more with transfer recipients, compared to richer voters. Fiva and Rattsø (2006) point to a characteristic of the Norwegian local government grant system that could lead to a distortion of the effect of gross income on welfare benefits:

“The equalizing grant system basically turns around the private income differences between the municipalities. The municipalities with a high private income level end up with relatively low local government revenue per capita, while private poor municipalities end up as relatively rich local governments.”

7 Extensions and robustness

In this chapter the econometric specification from chapter 6 is extended, to see how the results are affected when some changes are made to the specifications. The sample is split to see if the previous results hold up, and a new dependent variable is used to see the effect of equality on another measure of redistribution.

7.1 Results pre- and post 2001

Since the government started setting a national guideline for the welfare benefit level per recipient in 2001, the local governments had more freedom when deciding the welfare benefit level before 2001, and one would suspect equality (or inequality) to have a bigger impact on the benefit level before the introduction of a national guideline. We saw that municipalities adapted to the national guidelines both in table- and figure 4.3, meaning that municipalities had more discretion when deciding their welfare norm before 2001. It therefore seems likely that it is best to test the effect of equality in the years from 1993 to 2000.

To check this we run the same regressions as in table 6.2, but now run separate regressions for the years before and after 2001. Aside from the sample cut, specifications are unchanged from the previous section.

Table 7.1: fixed effects regression, 1993-2000. Welfare_norm and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) welfare_norm	(2) welfare_norm	(3) welfare_norm
equality	0.864 (0.539)	1.002* (0.547)	1.005* (0.547)
income	0.00176 (0.00138)	0.00198 (0.00142)	0.00199 (0.00142)
pop1000		0.00426 (0.0108)	0.00396 (0.0108)
age06		1.670 (1.888)	1.750 (1.898)
age715		-0.736 (1.621)	-0.654 (1.633)
elderly		2.392 (1.518)	2.414 (1.519)
voteshare_left			0.0944 (0.197)
Observations	3,414	3,414	3,412
R-squared	0.016	0.017	0.017
Municipalities	429	429	429

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results in table 7.1, for the years from 1993 to 2000, are still positive for all specifications and have increased slightly, but they still have little economical significance. A standard deviation change in the equality variable would lead to an increase in the welfare norm of 47 NOK. Once again, only specification (2) and (3) are statistically significant, at the 10% level. The equality coefficients from specification (2) and (3) are more or less unchanged from table 6.2, and a change in the measure of equality would still have a very minor impact on the welfare norms in each municipality. If we went from the least equal wage distribution in the data to the most equal, we would get a change in the welfare norm of 630 NOK, which is about a one standard deviation increase in the welfare norm.

The regressions from 2002-2008¹² however all turn out negative and statistically significant at the five- or ten percent level, showing that the effect of equality is reversed after the introduction of the national guideline. This is a natural implication of the fact that the municipalities adjusted to the new national guideline as shown in Fiva (2009), as local

¹² Not reported.

governments above the norm before 2001 had to reduce their norms to adapt to the national guideline and vice versa.

7.2 Heterogeneous effect

Fiva and Rattsø (2006) note that the spread in welfare benefits varies among municipalities within the same county, and in counties with small distances and transportation costs, they find that there is less variation in the expected benefits compared to counties with greater distances. Fiva (2009) finds that welfare policy has a significant impact on residential choices. It could be that the effect of equality differs with the degree of mobility between the municipalities; to check this we will try to see how welfare competition affects the results.

As explained in section 4, the sample is sorted by average municipality size in each county, and divided into two at the median. Separate regressions are run for the two groups. We suspect that welfare competition will be more prevalent in the “high-pressure” group that contains the municipalities in the counties with the lowest average municipality size, and equality is likely to have a lower effect in these municipalities, as welfare competition will drive the welfare norm down. Welfare policies in municipalities in the “low-pressure” group might be more robust to changes in neighboring municipalities’ welfare policies, as these municipalities might not have the same fear of a large influx of welfare recipients if their welfare policy is generous. As a result, equality could be expected to have a larger impact in these municipalities.

Table 7.2: fixed effects regression, “high-pressure” group, 1993-2008. Welfare_norm and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) welfare_norm	(2) welfare_norm	(3) welfare_norm
equality	-0.111 (0.497)	0.231 (0.506)	0.235 (0.507)
income	-3.00e-05 (0.00102)	0.000144 (0.00103)	0.000172 (0.00103)
pop1000		0.0126*** (0.00401)	0.0124*** (0.00402)
age06		1.127 (1.480)	1.200 (1.483)
age715		3.463*** (1.279)	3.385*** (1.281)
elderly		2.762** (1.211)	2.619** (1.218)
voteshare_left			0.252 (0.187)
Observations	3,192	3,192	3,184
R-squared	0.048	0.055	0.056
Municipalities	207	207	207

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7.3: fixed effects regression, “low-pressure” group, 1993-2008. Welfare_norm and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) welfare_norm	(2) welfare_norm	(3) welfare_norm
equality	-0.139 (0.432)	0.747 (0.462)	0.716 (0.463)
income	-0.000208 (0.00139)	0.00202 (0.00151)	0.00192 (0.00151)
pop1000		0.0520*** (0.0133)	0.0531*** (0.0134)
age06		-0.662 (1.467)	-0.681 (1.467)
age715		-0.837 (1.301)	-0.868 (1.301)
elderly		4.986*** (1.016)	5.035*** (1.017)
voteshare_left			-0.134 (0.134)
Observations	3,646	3,646	3,646
R-squared	0.096	0.107	0.107
Municipalities	229	229	229

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The equality coefficient is bigger in table 7.3 for the “low-pressure” group under specification (2) and (3), but none of the results are statistically significant. The difference in results could possibly be because welfare competition suppresses the positive effect of equality on redistribution in smaller municipalities, with local councils fearing an influx of welfare clients if they set their welfare norms higher. Even if this is the case the two coefficients are not statistically significantly different from each other, and the economic significance is still very small. Even though the coefficient in the “low-pressure” group is more than three times bigger than the coefficient in the “high-pressure” group under specification (2), a standard deviation increase in the equality would lead to a 11 NOK increase in the welfare norm for the municipalities in the “high-pressure” group, compared with a 35 NOK increase for the municipalities in the “low-pressure” group, indicating that equality does not have much of an impact in either of the groups.

7.3 Average payments per recipient

As mentioned, the politically decided welfare norm is not a strict rule in the municipalities, as the actual welfare payments are made by the local welfare offices. As such, it is not a given that the level of the political norm accurately describes the redistribution level. To counter this I will use another redistribution measure, with the dependent variable in table 7.4 now being the average monthly support per social client in the municipality,¹³ measured inconstant, 1000 NOK. The equation estimated is

$$supportpercase_{it} = \gamma_i + equality_{it}\beta + X_{it}\lambda + \xi_t + \epsilon_{it} \quad (7.1)$$

This is the same model used in the previous section with the same control variable specifications; except for the different dependent variable and that the time span is now 1997 to 2008, due to the availability of data.

¹³ This includes all welfare recipients, not just single-person households as with the welfare norm.

Table 7.4: fixed effects model, 1997-2008. Supportpercase and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) supportpercase	(2) supportpercase	(3) supportpercase
equality	-21.06*** (4.351)	-22.49*** (4.513)	-21.75*** (4.509)
income	-0.0578*** (0.00980)	-0.0616*** (0.0102)	-0.0604*** (0.0102)
pop1000		0.0545 (0.0598)	0.0501 (0.0597)
age06		12.72 (14.92)	12.01 (14.90)
age715		-7.077 (13.72)	-8.876 (13.71)
elderly		-8.718 (11.99)	-10.63 (12.01)
voteshare_left			3.151** (1.396)
Observations	5,184	5,184	5,178
R-squared	0.146	0.147	0.148
Municipalities	437	437	437

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We see that the equality coefficient is negative and statistically significant at the one percent level for all specifications, supporting the Meltzer-Richard hypothesis. Welfare clients in municipalities with a more unequal wage distribution receive a higher monthly welfare support, on average. This is in contrast to the results found in the three previous sections, with equality having a much larger impact in the regressions in table 7.4. A standard deviation increase in the equality measure would lead to a 988 NOK reduction of the average payment per welfare client in specification (1), a 1055 NOK reduction in specification (2) and a 1020 NOK reduction in specification (3), all highly economically significant changes. An increase in the equality measure of one standard deviation would lead to an approximate reduction in the support per recipient of one-tenth of a standard deviation.

This would seem to indicate that politicians and bureaucrats respond differently to increased inequality, or that the measure of average support per welfare recipient is flawed. The results could potentially be driven by a mechanical effect, as an increase in the number of welfare recipients in the municipalities would lead to lower wage equality, and an increase in the welfare support per case. The large magnitude of the equality coefficient in table 7.4 most

likely means that the dependent variable is not suited to test the effect of equality – it seems strange that equality should have a large negative impact on the actual welfare payments, but such a small positive impact on the politically decided welfare norm.

To test if the introduction of a national guideline in 2001 has affected the support per welfare recipient, we again split the observations up into pre and post 2001 observations in table 7.5. Specification (1) covers the period 1997 - 2000, while (2) covers 2002 - 2008. Both include demographic variables, the average gross income and the political variable *voteshare left*.¹⁴ We see that the two coefficients for equality are fairly similar and significant at the one percent level, indicating that the 2001 guideline has not had much of an impact on these results.

Table 7.5: fixed effects model, 1997-2000 and 2002-2008. Supportpercase and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) supportpercase	(2) supportpercase
equality	-31.04*** (7.806)	-27.02*** (6.584)
income	-0.0791*** (0.0207)	-0.0563*** (0.0135)
pop1000	0.403 (0.289)	0.0192 (0.0945)
age06	52.14 (35.48)	7.468 (25.13)
age715	-26.12 (32.72)	-48.52** (22.91)
elderly	93.80*** (31.77)	19.53 (22.58)
voteshare_left	3.218 (3.160)	1.250 (1.905)
Observations	1,732	3,013
R-squared	0.073	0.032
Municipalities	433	437

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

¹⁴ More basic specifications like the ones in previous sections did not have a significant impact on results and are not reported.

7.4 Extra controls

Reported in table 7.6 and 7.7 are the main regressions from section 6 and section 7.3 done again, but now with the extra controls *edupercent*, which is the percentage of the municipalities' population that have completed a minimum of three years university or college education, and *unemployment*, which is the percentage of the municipalities' population that are unemployed. These controls have not been added earlier, as they are potentially endogenous. Municipalities with a well educated population are likely to have less people in need of welfare, as there generally is a high correlation between income and education. The opposite is the case with unemployment; the unemployed are much more likely to need government welfare to cover their daily expenses.

Table 7.6: fixed effects model, 1993-2008. Welfare_norm and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) welfare_norm	(2) welfare_norm
equality	0.564* (0.338)	0.524 (0.342)
income	0.00178** (0.000777)	0.00166** (0.000796)
pop1000	0.0152*** (0.00451)	0.0153*** (0.00451)
age06	0.892 (1.035)	0.873 (1.035)
age715	0.224 (0.901)	0.223 (0.901)
elderly	3.917*** (0.769)	3.883*** (0.770)
voteshare_left	0.0225 (0.108)	0.0235 (0.108)
edupercent	8.240*** (2.978)	8.267*** (2.979)
unemployment		-0.642 (0.882)
Observations	6,830	6,830
R-squared	0.077	0.077
Municipalities	436	436

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

We see in table 7.6 that the two new variables reduce the results from table 6.2, but by very little and the difference is far from statistically significant. The new variables have the

predicted effect, with a higher educated population leading to a higher welfare norm *ceteris paribus*, and with increased unemployment leading to a decrease in the welfare norm. The effect of *edupercent* is statistically significant at the one percent level, but has little economical significance; a standard deviation increase in *edupercent* would lead to an increase in the welfare norm of 107 NOK. The effect of unemployment is close to zero and far from statistically significant.

Table 7.7: fixed effects model, 1997-2008. Supportpercase and income measured in constant, 1000 NOK. Time- and municipality fixed effects included in all regressions.

VARIABLES	(1) supportpercase	(2) supportpercase
equality	-21.82*** (4.509)	-19.95*** (4.529)
income	-0.0593*** (0.0102)	-0.0523*** (0.0103)
pop1000	0.0983 (0.0666)	0.0970 (0.0665)
age06	12.36 (14.90)	12.81 (14.88)
age715	-9.600 (13.72)	-10.59 (13.70)
elderly	-10.11 (12.02)	-7.250 (12.02)
voteshare_left	3.186** (1.396)	3.125** (1.394)
edupercent	-68.96 (42.19)	-71.97* (42.14)
unemployment		47.69*** (12.57)
Observations	5,178	5,178
R-squared	0.148	0.151
Municipalities	437	437

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

We see from table 7.7 that the added controls have a minimal impact on equality's effect on the payment per welfare client measure. The new controls now have the opposite effect on the support per case variable compared to the effect on the welfare norm. Unemployment has a much stronger effect in table 7.7 and is now statistically significant at the one percent level.

The large difference between the effects of the extra control variables on the two measures of redistribution strengthens the suspicion that the regressions with support per case as the

dependent variable are troubled by a mechanical effect. As unemployment grows in a municipality, the average welfare payout per client will increase, due to the fact that there are now more people in need of substantial welfare assistance in the municipality, while equality will go down. Similarly, the average payout goes down when the education percentage increases, as this reduces the number of people in need of assistance, due to the positive correlation between education and income, and equality will increase, as the median will most likely approach the mean. It therefore seems like the support per case variable is not a suitable measure for the amount of redistribution in the municipality, rather it would seem to reflect the total need for welfare among the municipalities' welfare clients.

8 Conclusions

This thesis has attempted to estimate the relationship between wage inequality and redistribution, using econometrics. The empirical work is done on Norwegian municipalities due to their similar size and structure, and their freedom when it comes to choosing their level of welfare benefits. The monthly welfare payments to single-person households, set by local politicians, have been used as the main measure for the amount of redistribution in each municipality.

The results from the regressions point mostly in the same direction, that increased equality has a small, statistically significant, positive effect on the welfare norm in each municipality, going against the Meltzer-Richard hypothesis. This effect is however so small that it carries little economic significance, and the main finding of this thesis is perhaps that wage inequality seems to have had little effect on the amount of redistribution in Norwegian municipalities from 1993 to 2008, at least through the channel of increased generosity towards welfare clients.

It is possible that equality does have a bigger effect on the amount of redistribution through other channels than the one looked at in this thesis. Borge and Rattsø (2004) finds that increased wage inequality leads to increased property tax in Norwegian municipalities; this possibility is not looked at in this thesis. It is also possible that equality has another, potentially stronger effect on redistribution, targeted towards other groups in society than welfare clients, such as the middle class. This is proposed by Moene and Wallerstein (2001). Ramcharan (2010) studies the relationship utilizing an instrumental variable approach to

establish causality, and finds a possible downward bias in his OLS results due to reverse causality. This could potentially be an issue in my results, although I judge this to be unlikely due to the measure of redistribution chosen.

The results also show the fact that local governments adapted to the national guideline for monthly welfare support introduced in 2001, with wage inequality having a positive effect on the results before the introduction of the guideline, and a negative effect afterwards. Equality is also found to have more of an effect on larger municipalities compared to the smaller ones, although this difference is small and not statistically significant. Knowing the results of previous studies on Norwegian municipalities, it seems likely that this difference is due to welfare competition.

The thesis also looks at how the average welfare payout per client in each municipality is affected by wage inequality. These results strongly contradict the earlier results, with equality having a large, statistically significant, negative effect on welfare payments. These results could indicate that bureaucrats and politicians respond differently to changes in wage inequality, or it could be that the average welfare payment per client variable is not suitable for use in the regressions because it does not account for the number of welfare clients in each municipality, or the heterogeneous nature of welfare clients as a group. The large discrepancy between the effect of equality on the politically decided welfare norm and the payments per recipient may indicate that there are problems with the payments per recipient variable. The effect of adding controls who measure the municipalities' education- and unemployment levels point in this direction, and show signs of a potential mechanical effect in the regression.

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