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WELFARE COMPETITION IN NORWAY

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Welfare competition in Norway[*)]

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Abstract

Local redistribution policy creates incentives for welfare migration that may result in 'underprovision' or even a 'race to the bottom'. This paper evaluates the empirical importance of welfare competition. Our contribution is to separate between the policy decision and the actual welfare benefit payments and to introduce income distribution as a determinant of welfare policy. Utilizing spatial econometric methods we find statistical significant strategic interaction between local governments for both the welfare benefit norm decided by the local council and the expected welfare benefits of a standardized person. No robust relationship is found between inequality and welfare benefits and thus we offer no strong support for the Romer-Meltzer-Richard hypothesis. We conclude that there is a geographic pattern in welfare benefits. This does not necessarily imply underprovision, since the grant financing of the local governments may generate overall excessive public spending.

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1. Introduction

Globalization with increased mobility of households and firms is often described as a threat to distribution policy. Some state this challenge in dramatic terms, with titles like 'can the welfare state survive?' and with propositions of a 'race to the bottom'. The issue has raised policy concern about fiscal decentralization and in particular about EU integration. Sinn (1994) has warned about the consequences for welfare of economic integration. A large literature initiated by Musgrave (1959) offers warnings against decentralization of the responsibility of distribution. Governments are encouraged to set fiscal variables to influence the location of households and firms when mobility is high, and the consequent fiscal competition will influence taxation and spending. The comprehensive theoretical literature is not matched by much empirical evidence.

In the area of welfare policy, countries have typically decentralized responsibilities to states and municipalities to take advantage of local knowledge and administration. The associated welfare competition may serve as a threat to the implemented welfare policy. When taxpayers and welfare recipients are mobile it seems likely that the local governments will seek to attract wealthy households and avoid potential welfare recipients. The empirical importance of such welfare competition is addressed in a series of US studies summarized by Brueckner (2000) and in recent studies of the UK (Revelli, 2003) and Sweden (Dahlberg and Edmark, 2004). The present paper provides empirical evidence for another country with decentralized welfare policy, Norway. The contribution of the paper is to separate welfare policy decisions and actual welfare payments and to include the role of income distribution for distribution policy.

The implementation of welfare policies includes the guidelines set by political institutions and the actual payments made by the welfare bureaucracy. This complicated line of implementation is typically overlooked in empirical studies. The US studies have concentrated on the benefit levels for AFDC (Aid to families with dependent children) and most authors (Berry et al. 2003, Figlio et al., 1998, Saavedra, 2000) have used the maximum amount given to a standardized family as the measure of benefit level. According to Peterson and Rom (1990), the maximum consists of a 'needs standard' and a share of the standard

covered. States differ both in their assessment of needs and in the share financed. Actual expenditures per recipient are used for the US by Bailey and Rom (2004), Revelli (2003) for the UK and Dahlberg and Edmark (2004) for Sweden. Average actual benefit payments represent both discretion in the welfare bureaucracy and composition effects. Bailey and Rom (2004) argue that maximum benefits and average benefits are highly correlated for AFDC. In our data there are large composition effects when average benefits are compared, primarily as a result of different duration of welfare spells. Consequently we separate between the welfare norm decided by the political institutions and measure the actual welfare payments based on individual data.

The analysis of actual welfare benefits is based on a unique dataset of computed expected benefits in each municipality based on individual characteristics, worked out and documented by Langørgen and Rønningen (2003). They utilize data for most of the grown-up population in Norway (more than 2,5 million individuals) and estimate expected welfare benefits received for comparable individuals. Welfare benefits are means-tested and based on an evaluation of the demands of each individual on a case-by-case basis. The individual demands vary and the welfare recipient population is quite heterogeneous, ranging from individuals in need for support for a few weeks till quite permanent welfare clients. The expected benefit measure is an attempt to take into account this heterogeneity. We also study the variation in norms for welfare benefit levels set by the local councils and expressing the direct political response to competition. The norms are set as guidelines for the administration and are specified as an amount paid to a 'standard user' (singe individual without children) per month.

Our second contribution is to address the importance of income distribution for distribution policy. The empirical analyses available typically are based on altruism. Higher income level motivates more distribution. We expand this understanding to include the Romer-Meltzer-Richard hypothesis of redistribution policy. When the median voter has less income than the mean, the typical income distribution observed, the decisive median voter will redistribute income. This is the key insight of Meltzer and Richard (1981). More uneven income distribution is associated with more redistribution. The theory is based on earlier work on optimal redistributive taxation by Romer (1975). Meltzer and Richard (1983) started up the empirical tests of the hypothesis in an analysis of US time series data of government

spending. They conclude that the spending level is negatively related to the ratio of median to mean income. We introduce this measure of income distribution as a potential determinant of welfare benefit levels.

In the analysis we investigate the possibility that the decisions of Norwegian local governments about welfare benefit levels depend on the benefit level in 'neighboring' municipalities.[1] We apply spatial econometrics methods to estimate the strategic interaction among local governments. The starting point is a fiscal demand function where the benefit level in each municipality is dependent on benefits in neighboring municipalities as well as economic and political characteristics. The endogeneity of other municipalities' welfare benefits is handled with instrumental variables.

Section 2 outlines the welfare competition mechanism, section 3 presents the econometric design, and the data are described in section 4. Section 5 shows and discusses our estimated interaction models, while a short summary of results and challenges for future work are dealt with in the concluding section.

2. Welfare competition mechanism

Centralization or decentralization of redistribution policy is an old issue in the economics literature. Oates (1972) offers an early analysis of the role of the mobility of the poor, whereby local redistribution can chase the rich to other municipalities and attract the poor. Orr (1976) formalizes the altruistic argument for welfare benefits, and shows that poor living in municipalities where they are a small fraction of the population are expected to receive higher welfare benefits than in municipalities where they are a large fraction. This cost effect implies that an inflow of poor people to a municipality will reduce the benefit level. Brown and Oates (1987) extend the Orr framework to include a migration function explicitly, which shows the elasticity of the number of poor with respect to the benefit level. They derive how the benefit level varies inversely with the elasticity of the migration function. The mobility of

[1] In most empirical analysis the neighborhood concept refers to geographic proximity, however neighbors may be selected on the basis of similarity in population size, demographic composition, income etc. In our empirical approach we apply a definition of neighbors based on contiguity.

the poor is a source of inefficiency in decentralized systems. The extensive theoretical literature on mobility and redistribution is summarized by Cremer and Pestieau (2003).

A simple and attractive theoretical framework relevant for our analysis is worked out by Wheaton (2000). A fixed national welfare population is distributed among municipalities and receives municipality specific welfare benefits. The welfare population is assumed small relative to the total population, and the decisive representative voter is an employed immobile taxpayer. The municipalities differ in population size and private income level. As a reference point, if we assume that the welfare benefit decision is taken at the national level, there is no welfare migration to take into account and the relevant tax price for benefits is the share of recipients in the population. This result reproduces Orr (1976). When welfare benefits are decentralized and welfare migration is taken into account, the response of the welfare recipients is internalized in the political decision. Wheaton develops the migration story of Brown and Oates (1987) emphasizing the elasticity of the recipients with respect to the benefit level. The elasticity raises the tax price of benefits and consequently contributes to underprovision compared to the national decision.

The migration part of the model assumes that welfare recipients have their own evaluation of the attractiveness of each municipality, and in addition to this their utility depends on the welfare benefits received in each municipality. The likelihood that recipients locate in a specific municipality follows a logistic function. This supply side of the welfare market implies a positive relationship between benefit level and welfare recipients in the migration equilibrium. The demand side shows how the political decision about the benefit level depends on the size of the welfare recipient group, and the benefit level will be reduced when the number of recipients goes up. The decision is affected by the benefit level in all municipalities through the endogenous determination of welfare recipients. The geographic pattern of benefits and recipients will depend on the migration response of the welfare recipients. When the migration response is strong, all municipalities spend less on welfare. The supply of welfare recipients is responsive to the benefit level, the benefit levels will vary little, but the recipient shares will vary much. The overall pattern will show small variation in benefits, but large variation in recipient shares. On the other hand, when the migration response is small, we expect a pattern with large variation in benefits and small variation in

recipient shares. The mechanisms of the model are similar to the assumed moving costs in Smith (1991). When psychic moving costs vary by individual, the competitive mechanism mainly will be represented by the individual welfare recipients with low moving costs.

An alternative understanding of the equilibrium mechanism in the US studies assumes wage adjustment. Brueckner (2000) presents the mechanisms based on Wildasin (1991), also discussed by Saavedra (2000) and Dahlberg and Edmark (2004). In this setup, the welfare recipients earn unskilled wage income at the labor market, and the wage response secures migration equilibrium. There is a cost effect of the number of welfare recipients, but also a wage effect. The wage adjustment may give negatively sloped reaction functions since higher benefits at a neighbor will induce outmigration and higher unskilled wage level, thereby motivating lower benefits. It seems unrealistic in our context to give such a prominent role to the unskilled wage adjustment, since most of the recipients are outside the labor market.

There is a separate literature addressing the mobility of welfare recipients. Most observers will agree with the conclusion of Meyer (2000) based on the US evidence that there is welfare induced migration, but that it is modest in magnitude. There are serious methodological challenges to identify welfare migration. Actual migration flows may be small because municipalities do respond to the competitive pressure. Welfare competition may also be observed even when potential welfare migration is negligible. The performance of neighboring municipalities may give voters information to evaluate their own municipality. Salmon (1987) discusses the argument for decentralization based on such yardstick competition, and Besley and Case (1995) offer empirical evidence. In this paper we will make no attempt to investigate the sources of welfare competition.

The Wheaton model offers more specific hypotheses about municipality characteristics, in particular the private income level. Municipalities with higher private income level (and also with higher grants) have higher marginal benefit of altruism and will set a higher benefit level and have higher share of welfare recipients. There might however be other rationales for redistribution to the poor. The marginal benefit of redistribution may also increase with income due to a desire to reduce the negative externalities attached to poverty (such as crime etc). Redistribution is however not necessarily increasing with income level of the

municipality. If income level reflects the extent of poverty, social insurance may lead to higher redistribution with lower income level. The possibility of becoming poor motivates the non-poor majority to redistribute. This leads to political economy arguments that may imply a negative relationship between income level and benefit level. Boadway and Keen (2000) give an overview of motives for and politics of redistribution. The political aspects generally imply that income distribution influences the redistribution policy. The key hypothesis was suggested by Meltzer and Richard (1981), that more inequality generates more distribution. We include a measure of the income distribution as a determinant of welfare benefit level.

The theoretical literature of welfare competition discussed above implies a simultaneous determination of welfare benefits and welfare recipients. We concentrate on the reduced form determination of welfare benefits. The estimated equation for welfare benefits in municipality i under strategic interaction can be written:

$$b_i = b_i(b_1,..,b_{i-1},b_{i+1},..,b_I,y_i,\tau_i) \qquad \textbf{(1)}$$

Welfare benefit level in municipality i is b_i and covers all I municipalities. The average income level of municipality i is y_i, and τ_i is a measure of the income distribution. The response of the benefit level in municipality i to the benefit level in other municipalities indicates welfare competition, the decision about benefit level in each municipality is not taken in isolation.

3. Empirical modeling of welfare competition

In the econometric literature strategic interaction is known as spatial autocorrelation. The formal framework used for the statistical analysis of spatial autocorrelation is a so-called spatial stochastic process. We follow the most frequently used approach to formally express spatial autocorrelation and specify a functional form for the spatial stochastic process that relates the value of the random variable at a given location to its value at other locations:[2]

$$\mathbf{b} = \alpha \mathbf{W}\mathbf{b} + \mathbf{x}\boldsymbol{\beta} + \mathbf{u} \qquad \textbf{(2)}$$

[2] For other possible approaches see Anselin (2001).

where **b** is a vector of welfare benefit levels, **W** is the spatial weights matrix, **x** is a matrix of welfare benefit determinants of every municipality, **β** is a vector of parameters and **u** is a vector of i.i.d. error terms with variance σ_u^2. For each municipality **W** assigns municipalities of reference (referred to as 'neighbors' in the literature) and their relative weights. The weights are determined apriori and can be considered as part of jurisdiction i's basic characteristics. In this analysis we follow the literature on fiscal competition and choose a definition of neighbors as municipalities with a common border. For ease of interpretation the elements of **W** are row-standardized, such that for each i, $\sum_j w_{ij} = 1$.[3] Then **Wb** yields a spatially weighted average of the welfare benefits in the neighboring municipalities. While the choice of weights is based on prior evaluation concerning the pattern of interaction, the interaction effect, α, is estimated from the data. α can be interpreted as the slope coefficient of the reaction function and is the parameter of interest.

An econometric challenge is that the spatial lag term **Wb** is correlated with the disturbances, even when the latter are iid. This can be seen from the reduced form of (2). Assuming that $(\mathbf{I} - \alpha\mathbf{W})$ is invertible, the reduced form is given by:

$$\mathbf{b} = (\mathbf{I} - \alpha\mathbf{W})^{-1}\mathbf{x}\boldsymbol{\beta} + (\mathbf{I} - \alpha\mathbf{W})^{-1}\mathbf{u} \qquad \textbf{(3)}$$

implying that

$$E((\mathbf{Wbu}')) = \mathbf{W}(\mathbf{I} - \alpha\mathbf{W})^{-1}\sigma_u^2 \neq 0 \qquad \textbf{(4)}$$

When the welfare benefit levels of the municipalities are potentially interdependent, we must model the determination of benefits as simultaneous. Standard OLS estimation yields in this case biased and inconsistent estimators. If the proper specification of the model is given by (2) and the welfare competition hypothesis is right ($\alpha > 0$) then OLS gives an upward bias in the estimate of α. The literature suggests two different approaches to handle the simultaneity.

[3] This implies that $W_{ij} = 1/m_i$ when municipality i and j share a border and 0 otherwise (m_i being the number of neighbours to municipality i).

We can either estimate the reduced-form equation (3) by Maximum Likelihood (ML) methods or we can apply an Instrument Variable (IV) approach. The ML method rests strongly on the assumptions about the normality of the error terms and this might not be appropriate. We return to this issue below. The IV approach is more intuitively appealing – the spatially weighted average of benefit levels are replaced with fitted values from an auxiliary regression.

With proper instruments the IV method yields unbiased and consistent estimates.[4] In the empirical analysis carried out in section 5 we utilize the solution proposed by Kelejian and Robinson (1993) namely to use **WX** as instruments. This is in line with what Besley and Case (1995) and Figlio et al. (1998) among others do. However, realizing that invalid instruments may cause biases in the estimates we also include ML estimates in the empirical analysis. This is the approach pursued by Saavedra (2000). Revelli (2003) applies both methods.

An observed spatial pattern in welfare benefits is not necessarily due to competition among local governments. Also common shocks and unobserved correlates will appear as spatial auto-correlation. It is obviously of great importance to separate the former spatial lag dependence from the latter spatial error dependence. With spatially correlated omitted variables, we have a pattern of spatial error dependence of the form:

$$\mathbf{u} = \lambda \mathbf{M}\mathbf{u} + \boldsymbol{\varepsilon} \qquad \textbf{(5)}$$

where $\boldsymbol{\varepsilon}$ is a well behaved error vector and **M** is a neighbor matrix. ML estimation that assumes that u is i.i.d. yields in this case biased estimates. Estimating such a model can in principle lead to a false conclusion of welfare competition (α>0) when α=0 holds in the true model.[5] In section 5 we apply the robust LM tests proposed by Anselin et al. (1996) to test whether $\lambda = 0$. However, an observed spatial autocorrelation ($\alpha \neq 0$) is not attributable to

[4] Valid instruments are correlated with **Wb**, but uncorrelated with the error terms from (2).

[5] Consider for example the case where the error term is given by (5) and there is no strategic interaction ($\alpha = 0$). Assuming that **M**=**W** and substituting (5) into (2) yields in this case: $\mathbf{b} = \lambda \mathbf{W}\mathbf{b} + \mathbf{x}\boldsymbol{\beta} - \lambda \mathbf{W}\mathbf{x}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$.Note that except for the extra term, $-\lambda \mathbf{W}\mathbf{x}\boldsymbol{\beta}$, this model has the same "appearance" as the model in (2). The error autoregressive parameter λ appears now as the parameter of the lagged dependent variable **Wb** and we may falsely reject the null hypothesis of no strategic interaction.

common unobservable shocks that may have hit neighboring municipalities when the spatial lag model is estimated with the IV method with valid instruments (see Kelejian and Prucha (1998) for a formal proof of this property). An observed correlation will be caused by changes in the component of neighbors benefit levels that is attributable to neighbors' (exogenous) observable variables. The concern for lack of identification of welfare competition is related to the difference between endogenous and exogenous interactions emphasized by Moffitt (2001). Our approach assumes away exogenous interaction, that benefit levels are influenced by characteristics of the neighboring municipalities other than their benefit level. This will be discussed below.

To identify strategic interaction between local governments in Norway we estimate this (second stage) empirical counterpart of equations (1) and (2):

$$b_i = \beta_0 + \alpha \sum_{j=1}^{n} w_{ij} b_j + \sum_{k=1}^{K} \beta_k CONTROL_{ki} + u_i \qquad \textbf{(6)}$$

We apply a set of K control variables.[6] The discussion in section 3 includes two key demand variables, the average private income level ($\overline{y}$) and a measure of the income distribution (τ). The skewness of the income distribution is represented by the ratio of median to mean income ($\frac{y_m}{\overline{y}}$). This is the standard measure of income distribution in the literature relating to the Meltzer-Richard hypothesis and the same variable as applied by Borge and Rattsø (2004) in a study of taxation and income distribution in Norway. The additional set of control variables is based on findings from earlier studies of Norwegian local government behavior, notably Borge and Rattsø (1995).[7] First, the main source of revenue is grants (g) including block grants and regulated income- and wealth taxes. Second, the population size (n) of the municipalities may influence costs and preferences. Third, the local government services are partly age specific (like schooling) and the preferences vary with the age composition of the

[6] The first stage regression is given by: $\sum_{j=1}^{n} \hat{w_{ij}} b_j = \gamma + \sum_{k=1}^{K} \nu_k \sum_{j=1}^{n} w_{ij} CONTROL_{kj} + \sum_{k=1}^{K} \eta_k CONTROL_{ki}$, where γ, ν_k og η_k are parameters to be estimated.

[7] Description of variables and descriptive statistics are found in appendix table 1.

population, and hence the population shares of children (ch), young (yo) and elderly (el) are included. Fourth, the share of socialists in the local council (soc) is incorporated as control variable to capture ideological differences. Finally we control for the differences in cost of living across municipalities, using a price index (per square meter) for used freeholder houses (sqm price).[8]

Social characteristics of the population (such as unemployed) are certainly relevant to capture the demand for welfare benefits, but they are influenced by the welfare migration and consequently are endogenous. They are excluded from our basic regression model, but the robustness of our results is investigated by including education level, unemployment rate and the share of divorced, to be discussed in section 5.

4. Data: Chosen welfare benefit levels in Norway

Welfare benefits in Norway are decentralized to local governments. Assistance to the poor has been a local responsibility for more than 150 years, and the basic argument is that the local governments have the knowledge about the population and its living conditions needed to set the benefit level. The Norwegian population of about 4,5 millions is divided into 434 local governments with an average size of 10.000 inhabitants. The local governments are democratic institutions led by an elected local council. The financing of the local governments is quite centralized (grants and regulated income and wealth taxes) with some discretion related to user charges and property taxation.

The welfare policy of the local governments is based on law. The welfare benefit system is regulated by the Social Service Act, which states criteria and guidelines for the benefits. The local governments have substantial discretion in determining the welfare benefits, both regarding eligibility and the level of benefits. This discretion yields substantial variation in the benefit levels across municipalities. The central government influences the incentives of the local governments by two elements of the grant system. The first is tax equalization where

[8] In preliminary analysis we also tested for the possible impact of the share of women in the local council, party fragmentation of the local council, local government interest payments and settlement pattern, but they were all found to have no impact on the welfare benefit levels and are therefore excluded from the analysis presented.

low per capita income tax revenues are compensated by about 90% below a national norm which is above the average income tax revenue. The second is expenditure equalization where characteristics of the population (in particular age composition) and local cost factors are taken into account in the calculation of the block grant. These elements imply that local governments do not face the full economic consequences of welfare migration.

Empirical research has addressed the differences in welfare benefit spending between local governments, and these studies have served as input to the expenditure equalization system. Langørgen (1995) concentrates on welfare benefit spending per capita and shows how they vary first and for all with social characteristics such as unemployment, share of refugees in the population, and family structure (share of divorced in the population). He also separates between welfare benefit spending per recipient on average and share of welfare recipients in the population. As expected, the social characteristics (unemployment, refugees, divorced) strongly increase the share of welfare recipients. The average benefits per recipient reflect composition effects. Average benefits increase with the share of refugees and the share of divorced and decrease with social security participation. Midtsundstad et al. (1999) have written a reanalysis of Langørgen using more recent and more detailed data and with basically the same results. The political decision of setting the welfare benefit level and the welfare competition involved are not explicitly addressed in these studies. In our context the social characteristics represent a potential endogeneity problem. The main lesson we draw is that studies of actual average benefits per recipient are likely to reflect important composition effects (refugees, unemployed etc.) that are hard to isolate.

Given the documented heterogeneity of welfare recipients among municipalities, it is a challenge to describe the welfare benefit level in a comparative analysis. We are surprised by the limited attention put to this problem in the empirical welfare competition literature. We handle this by separating between the welfare benefit norm set by the local politicians and the actual welfare payments based on individual data. Welfare competition is primarily a concern for local politicians. The actual benefit levels obtained at the individual level will vary with the operation of the welfare offices and their social workers. The welfare benefit norm decided at the local government level may not reach down to the social workers handling each individual. To investigate differences at the political and administrative level, we study the

variation in norms for welfare benefit levels set by the local councils. The norms are set as guidelines for the administration and are specified as an amount paid to a 'standard user' per month. We utilize the reported norms for single persons without children receiving welfare benefit per month measured in 1000 NOK in 1998 (bn). The norm set by the local council reflects the preferences of the politicians and is consequently of interest independently of the actual individual benefit levels. Appendix Table 2 documents the variation. It should be noticed that the central government since 2001 has announced a national welfare benefit norm and most municipalities have converged to this norm. The central government intervention can be understood as a response to the large differences among municipalities observed in the data for 1998 that we have available.

It is certainly of interest to investigate whether the welfare competition also affects the actual welfare payments. Because of the heterogeneity of the welfare recipients, comparison of actual welfare benefits between municipalities must be based on individual data. Langørgen and Rønningen (2003) have estimated the relationship between individual characteristics and welfare benefits based on a large dataset covering more than 2,5 million individuals in 433 municipalities in 1998. The analysis allows a calculation of the expected welfare benefits for an individual with specific characteristics in each municipality. The endogenous variable (b) is defined as expected welfare benefits for a standardized reference person[9] measured in 1000 NOK per year. The variation is described in Appendix Table 2 with an average of NOK 30.059 per year and varying from a minimum of NOK 24.060 to a maximum of NOK 35.596.

The expected welfare benefits for a standard recipient include all payments received by the individual, while the welfare benefit norm generally does not include housing expenses. Housing costs vary by individual and are not stated as a norm by the politicians. It follows that the two measures are not comparable and also the two measures of the welfare benefit level show close to no correlation (the correlation coefficient is -0,05).

[9] The reference person is a single, Norwegian man, 16-30 years old who is neither disabled, nor long-term unemployed. He has low education and pays no maintenance and receives no basic and supplementary benefits.

5. Estimated welfare competition

Empirical evidence for the welfare competition hypothesis implies a geographical pattern in welfare benefits. Looking for such a pattern we start out by a description of differences in welfare benefits at the county level in Appendix Table 3. The welfare benefit level varies between the 18 counties, and more important, the spread among municipalities within each county varies. In particular we notice that expected benefits are quite homogenous (low coefficient of variation) in counties with fairly small distances and low transportation costs such as Østfold, Akershus, Hedmark, Oppland, Sør-Trøndelag and Buskerud. On the other hand there are large differences in expected benefits within counties with large distances and high transportation costs such as Sogn og Fjordane, Nordland and Troms. These differences are consistent with welfare competition, but they may also reflect differences in social and demographic structure and urbanization.

The classical measure of spatial dependence is the Moran statistic (Anselin, 2001). The statistic can be considered as a spatial analog to time series autocorrelation and is formally given by:

$$I = \mathbf{u}'\mathbf{W}\mathbf{u}/\mathbf{u}'\mathbf{u} \qquad \textbf{(7)}$$

where **u** is a vector of OLS residuals and **W** is the spatial weight matrix. The I-statistic is computed under the null hypothesis that errors are normally distributed.

A natural first investigation of the spatial structure is to regress the endogenous variables (b and bn) on a constant and evaluate the Moran statistic. This raw measure of spatial dependence indicates a strong spatial pattern based on neighborhood.[10] Leaving out the strategic interaction term in equation (6) and estimating the model by OLS (reported as model A in Tables 1 and 2) the Moran test still provides strong evidence for the existence of spatial dependence for both measures of welfare benefits. The Moran test yields a value of 6,70 and 5,34 for b and bn respectively, indicating that we confidently (at above the 99% confidence

[10] The Moran statistic takes the value: 9,46 and 7,72 for b and bn respectively (both significant at well above the 99% confidence level).

level) can reject the null hypothesis of absence of spatial autocorrelation. Note that the Moran test cannot say whether it is spatial lag dependence or spatial error dependence that is the driving force behind the spatial pattern. Anselin et al. (1996) have however proposed two Lagrange Multiplier (LM) tests based on the OLS residuals that are robust to the presence of local misspecification of the other form of spatial dependence. These tests follow a χ^2 distribution with one degree of freedom and test for spatial lag dependence that is robust to spatial error dependence (and vice versa).[11] Results from the robust LM-tests based on our OLS-regression for our two measures of welfare benefits are reported in Table 1.

Table 1 about here

Controlling for spatial error dependence, the H_0 of absence of spatial lag dependence ($\alpha = 0$) must be rejected for both our measures of benefit levels at the 1% level. The tests also indicate some traces of spatial error dependence, but it is not statistically significant at the 10% level. The LM tests that are not robust to misspecification of the model conclude with the presence of both types of spatial dependence (not reported). When there is a clear discrepancy between the regular and the robust LM tests for spatial error dependence, and both the regular and the robust tests for lag dependence are significant, there is strong evidence for spatial lag dependence, as Anselin et al. (1996:97) points out. The Monte Carlo simulations by Anselin et al. indicate that the robust LM tests are more appropriate to test for lag dependence in the presence of error dependence than for the reverse case. Thus, the LM tests indicate that local governments tend to mimic each other in the determination of welfare benefits and furthermore that the spatial lag model seems to be the most likely alternative for describing the geographic pattern. We cannot however completely eliminate the possibility of error dependence and hence the ML estimates reported below may be biased.[12] A strength with the IV approach is, as discussed in section 3, that it yields estimates that are robust to the presence of spatial error dependence, given that the instruments are properly chosen. For the

[11] Anselin et al. (1996) also investigate the performance of the tests under Monte Carlo simulation experiments. They show that the robust LM tests perform better than their unadjusted counterparts and that the tests also perform well when the left-out type of dependence is not present.

[12] In principle it is possible to estimate a model that allows for both types of spatial auto-correlation, but reliable estimation of the separate parameters α and λ is difficult (Anselin et al. 1996).

instruments to be valid they need to be correlated with the spatially lagged dependent variable and uncorrelated with the error term. To test for the latter property we apply the Sargan (1958) test. This test follows a χ^2 distribution with degrees of freedom equal to the number of overidentifying instruments. For both our measures of welfare benefits we fail to reject the null of instrument exogeneity (reported in Tables 2 and 3). The test results presented indicate that estimation of a spatial lag model based on both ML and IV approaches seem fruitful. In Tables 2 and 3 we also report two OLS specifications of (6) as baselines for comparison.

The focus in Table 2 is on the computed welfare benefits based on individual data (b). We find an economically as well as statistically significant interaction effect. The reaction curves are found to be upward sloping, higher benefits in neighboring municipalities lead to higher benefits of the municipality considered. Interpreting the result in terms of the Wheaton model, higher benefits in neighboring municipalities raise the marginal utility of the benefits in the municipality and consequently lead to higher benefits. In game theoretic terms welfare benefit levels in contiguous municipalities are strategic complements. The quantitative effect of the IV estimation implies that an increase in the welfare benefit level by NOK 1000 per year in neighboring municipalities will raise the benefit level in the municipality by NOK 800 per year.[13] The ML and OLS estimates indicate a somewhat smaller interaction effect and predict an equivalent increase of benefits of NOK 390 and NOK 610 per year. The OLS estimates may be biased for two reasons, first because of the endogeneity of welfare benefits (upward bias) and second because of spatial error correlation. The spatial error correlation typically is negative under migration and endogenous sorting of the welfare recipients, and this negative effect dominates in our case.[14] This understanding is consistent with the ML estimates being smaller than the IV estimates. ML takes into account the simultaneity in the determination of welfare benefits, but is sensitive to left out spatial error correlation. Bordignon et al. (2003) discuss ways of separating yardstick competition from mobility competition, and they argue that yardstick competition is expected to generate positive spatial error dependence.

[13] The numbers of neighbors ranges from 1 to 11. The median number of neighbors is 5. This indicates that for a typical municipality, an increase in one of the neighbors' benefit level with 1000 NOK will raise the benefit level in the municipality with 160 NOK.

[14] Besley and Case (1995), Figlio et al. (1999) and Dahlberg and Edmark (2004) also find OLS to be downward biased.

Table 2 about here

When welfare competition shows up in actual welfare payments above, we also expect to identify welfare competition when measured by the politically determined welfare norm. The estimates based on the reported welfare norms are shown in Table 3. The results confirm strategic interaction, upward sloping reaction curves, and quantitative effects similar to those of expected welfare benefits in Table 2. The reaction coefficient is 0.81 for the welfare norm compared to 0.80 for computed welfare benefits, when estimated by instrument variables. Again we find that $\hat{\alpha}_{ML} < \hat{\alpha}_{OLS} < \hat{\alpha}_{IV}$, and all the estimates are of the same magnitude in the two tables. Given that the two measures describe different aspects of the local welfare benefit, the similar results for the two are comforting.

Table 3 about here

The theoretical models of welfare competition discussed in section 2 emphasize the private income level as a determinant of welfare benefits and that redistribution is motivated by altruism. Higher private income level consequently is associated with higher welfare benefit level. Our estimates do not confirm this altruism. The private income level has a significantly negative effect on the expected welfare benefits based on actual payments (Table 2) and is independent of the politically determined welfare benefit norm (Table 3). The result challenges the key approach in the theoretical literature on welfare competition. The interaction and income effects add up to a geographic pattern. Akershus for example is a private rich county close to Oslo with quite low welfare benefits and with little variation across municipalities. Finmark on the other hand, has low private income level, more variation across municipalities and generally high welfare benefits.

The empirical literature is inconclusive regarding income effects, as summarized by Ribar and Wilhelm (1999) for the US literature on welfare benefits. The majority of the analyses report a positive relationship between private income level and benefit levels, but exceptions do occur. Gramlich and Laren (1984) argue that the most likely reason for a negative income

effect is a motive for income security: "Voters may be more inclined to vote for transfer benefits if they feel they may need them some day, due to uncertainty about their own income. They may even empathize more with transfer recipients if subject to uncertainty in their own income stream" (1984: 492). This rationale to redistribute might be driving our strong negative impact of private income on expected welfare benefits.

In addition to this possible interpretation, we will put the attention to the working of the grant system. The equalizing grant system basically turns around the private income differences between 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. The grants, including regulated taxes and representing about 80% of local government revenue on average, have a positive effect on the welfare benefit level (although not statistically significant for the IV-estimates in Table 3). Rich local governments tend to have higher welfare benefits. In the example above, Finmark has local government revenue per capital well above the average and Akershus well below. When local government revenue is not much associated with the local private income level, the private income variable basically reflects preferences for local government services. Given this interpretation, the preference for welfare benefits is declining with private income in Table 2.

We have extended the analysis of private income to test the Romer-Meltzer-Richards hypothesis that redistribution is rising in inequality. More unequal income distribution will create a majority for more redistribution. The empirical literature investigating the hypothesis has concentrated on the size of the public sector and has utilized cross-country data. The results are basically negative, countries with large inequality do not have larger public sector. We think that it is more productive to look at the hypothesis in the context of decentralized government with comparable institutions. Alesina et al. (2000) exploit this type of data in a recent study of US cities, and find a positive relationship between inequality and public employment. Borge and Rattsø (2004) show that more equal income distribution implies a shift in the tax burden from property taxes to poll tax and thereby gives less redistribution in Norwegian local governments. Encouraged by these findings, we look at the relationship between inequality and welfare benefits, and the income distribution is measured by the ratio of median to mean income. The results do not offer strong support for the Romer-Meltzer-

Richard hypothesis. The ratio of median to mean is negatively related to the expected welfare benefits in Table 2, the benefits are then increasing with inequality, but the coefficients are never statistically significant. The relationship between inequality and welfare benefit norm in Table 3 has the wrong sign and is statistically significant in the OLS estimations. The result that inequality tends to reduce the welfare benefit level is consistent with a cost effect of redistribution. The only study we know of income distribution and welfare spending is Rodriguez (1999) of the US states, and he finds no statistically significant relationship.

Two other aspects of the political decision making are included. First, the age distribution of the population represents the demand for local welfare services, which to a large extent are directed towards children, young and elderly. We expect that larger 'client' groups of the welfare services may crowd out welfare benefits, since they compete within the local government budget. Our ML estimates of expected welfare benefits in Table 2 do indicate such competition between welfare services and welfare benefits, especially with respect to the share of children and elderly. However, the coefficients are not statistically significant in the IV specifications. The crowding out is not identified for the welfare norm in Table 3, and it is puzzling that the ML estimates indicate a positive effect of some age groups. Second, we incorporate political preferences by including socialist share in the local council. Ideology is shown to be important for the priorities in many other studies of Norwegian local governments. In this context it is an important control also in the analysis of private income level and income distribution as determinants. The sign of the coefficient is as expected, larger share of socialists in the local council is associated with more generous welfare benefits, but the coefficient is only statistically significant in the benchmark OLS version of Table 2.

Finally we have applied some other controls. According to the Wheaton model, larger municipalities in population size are expected to have lower tax price for redistribution and therefore choose to have higher benefit level. The expected welfare benefits in Table 2 do increase with population size, when the variable is inserted on logarithmic form. A measure of housing costs in the municipality (sqm price) is important for the expected welfare benefits including support for housing. The welfare benefit norms exclude housing support in about 95% of the municipalities, and a significant dummy variable represent those including such

costs (raising the norm by approximately NOK 460 per month).

The robustness of the results has been checked in various alternative specifications not reported. When the income distribution variable is excluded, the strategic interactions and the private income effects are basically the same. We have been more concerned with the heterogeneity issue, in particular since earlier empirical research has found social characteristics to be important determinants of welfare benefits. In our setting they are problematic control variables because of endogenous sorting of households. We have run regression including three social characteristics, the shares of the population that are unemployed, divorced and have 9 years of education or less. Inclusion of these variables does not have any impact on the estimated reaction coefficient for the politically determined norm. The estimated reaction coefficient based on the expected welfare benefits (b) is reduced in this specification ($\hat{\alpha}_{IV}$=0,29** (0,14), $\hat{\alpha}_{ML}$=0,29*** (0,06)), but is still statistically significant. We conclude that it of interest to pursue the sorting issue in future research.

The empirical literature on welfare competition basically offers evidence about the US states and the AFDC-program (Aid to Families with Dependent Children). The two main studies of strategic interaction, Figlio et al. (1999) and Saavedra (2000), conclude that strategic interaction is important, Figlio et al. find reaction coefficients of the sign and size reported here, about 0.9. They show that the effect is asymmetric, and the competition effect is only significant downwards, that is when neighboring states reduce their benefit level. Saavedra's result also suggests that American states behave strategically in setting their AFDC benefits. Brueckner (2000) has summarized the existing US evidence, including studies addressing welfare migration. We only know two studies outside the US states. Revelli (2003) analyses social service spending in UK local governments and identifies an interaction effect with elasticity of 0.2. He concludes that this is likely to follow from yardstick competition. His econometric design in particular attempts at separating between the consequences of common shocks and interaction, and he finds no spatial error interdependence representing common shocks. Dahlberg and Edmark (2004) apply an approach similar to ours for Swedish data of welfare benefits, having the advantage of a panel and utilizing placement of refugees as an exogenous instrument. They find statistically significant strategic interaction effects at a magnitude of 0,65. Our study consequently adds to the building up of international evidence

that welfare competition matters.

6. Concluding remarks

When the allocation of welfare benefits is decentralized to local governments, incentives for welfare migration are created and may result in 'underprovision' or even a 'race to the bottom'. It is an empirical issue whether this is important. We contribute to the empirical evaluation of welfare competition in an analysis of welfare benefits in Norway. The study separates between the policy decision and the actual welfare benefit payments. The first is the welfare benefit norm decided by the local council, while the other is based on individual data and calculates the expected welfare benefits of a standardized person. Robust LM tests for spatial dependence of both measures conclude that the H_0 of absence of spatial lag dependence must be rejected at the 1% level of significance. To further investigate the relationship we utilize spatial econometric methods in specifying a reaction function in which the welfare benefit level in one municipality is dependent on the benefit levels in neighboring municipalities and own socioeconomic characteristics. The estimated strategic interaction between local municipalities is statistically significant for both measures of welfare benefit level and confirms the hypothesis of welfare competition.

In theory, welfare competition implies underprovision of welfare benefits. In the Norwegian system, the centralized grants financing of the local governments may generate overall excessive spending. It follows that we cannot say that the welfare competition leads to ‘too low’ welfare benefits in Norway, but we can conclude that there is a geographic pattern in welfare benefits. Our analysis indicates that the observed spatial pattern is not attributable to common unobservable shocks that may have hit neighboring municipalities or omitted spatially correlated variables. The strategic interaction is caused by changes in the component of the neighbors benefit levels that is attributable to neighbors’ observable variables, which we use as instruments.

The main econometric challenge is the separation between endogenous and exogenous interaction raised by Moffitt (2001). Exogenous interaction occurs when the characteristics of the municipalities applied as instruments for neighbor’s welfare benefits are endogenous due

to sorting of households. If this is the case, when benefit levels are influenced by characteristics of the neighboring municipalities other than their benefit level, the reaction coefficients do not necessarily imply strategic endogenous interaction. Our Sargan test of the instrument variables indicates that they are exogenous. Dahlberg and Edmark (2004) address this problem and apply placement of refugees as an instrument in a panel data set. They conclude that exogenous interactions are negligible, and their result supports our approach. Future research should address the issue of exogenous interaction.

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Table 1: Tests for spatial dependence

	For b	**For bn**
Moran's I	6,70 (0,00)	5,34 (0,00)
Robust LM for spatial lag dependence ($H_0 : \alpha = 0$)	12,03 (0,00)	11,18 (0,00)
Robust LM for spatial error dependence ($H_0 : \lambda = 0$)	2,22 (0,14)	2,48 (0,12)

Note: Tests based on the OLS residuals from specification A in Tables 2 and 3. P-values in parentheses. Critical values for the $\chi^2_{(1)}$ is 2,71 , 3,84 and 6,63 for the 10%, 5% and 1% significance level respectively.

Table 2: Dependent variable: b (Expected welfare benefit of standardized recipient, based on individual data estimation)

	A OLS	B OLS	C IV	D ML
W_b		0,61*** (0,08)	0,80*** (0,19)	0,39*** (0,06)
$\overline{y}$	-0,033***	-0,023***	-0,020***	-0,027***
	(0,006)	(0,006)	(0,007)	(0,006)
$\frac{y_m}{\overline{y}}$	-1,32 (1,54)	-0,86 (1,43)	-0,71 (1,45)	-1,03 (1,43)
g	0,040** (0,020)	0,033* (0,018)	0,031* (0,019)	0,035* (0,018)
log N	0,75** (0,30)	0,56** (0,28)	0,51* (0,29)	0,63** (0,28)
ch	-26,90***	-14,40 (9,57)	-10,65 (10,24)	-18,86** (9,45)
	(10,20)			
yo	-8,05 (6,97)	-5,41 (6,49)	-4,61 (6,58)	-6,36 (6,48)
el	-12,59***	-7,79** (3,67)	-6,36 (3,92)	-9,51*** (3,62)
	(3,89)			
soc	1,45** (0,64)	0,50 (0,60)	0,22 (0,66)	0,84 (0,60)
sqm price	0,16** (0,08)	0,14* (0,07)	0,13* (0,08)	0,15* (0,08)
R^2				0,183
R^2_{adj}	0,117	0,236		
# obs.	433	433	433	433
Sargan			7,13 (0,52)	

Note: Data on welfare benefits are from Langørgen and Rønningen (2003), Statistics Norway. Standard errors in parentheses. ***, ** and * denotes significance at 1%, 5% and 10% level respectively. A constant term is included in all regressions (not reported). Sargan (1958) test with 8 degrees of freedom, p-value in parenthesis.

Table 3: Dependent variable: bn (Welfare benefit norm per recipient)

	A OLS	**B OLS**	**C IV**	**D ML**
W_bn		0,59*** (0,08)	0,81*** (0,18)	0,36*** (0,06)
$\overline{y}$	-0,003 (0,002)	-0,002 (0,002)	-0,001 (0,002)	-0,002 (0,002)
$\frac{y_m}{\overline{y}}$	1,91*** (0,56)	1,17** (0,54)	0,90 (0,58)	1,47*** (0,53)
g	0,017** (0,007)	0,010 (0,006)	0,008 (0,007)	0,013* (0,007)
log N	-0,08 (0,11)	-0,08 (0,10)	-0,08 (0,11)	-0,08 (0,10)
ch	3,84 (3,71)	-0,77 (3,57)	-2,46 (3,80)	1,06 (3,51)
yo	7,07*** (2,55)	4,82** (2,43)	4,00 (2,52)	5,71** (2,40)
el	2,59* (1,42)	1,32 (1,36)	0,85 (1,41)	1,82 (1,34)
soc	0,19 (0,23)	0,12 (0,22)	0,09 (0,22)	0,15 (0,22)
sqm price	0,04 (0,03)	0,04 (0,03)	0,05 (0,03)	0,04 (0,03)
housing included	0,45*** (0,11)	0,46*** (0,10)	0,47*** (0,11)	0,46*** (0,10)
R^2				0,180
R^2_{adj}	0,135	0,229		
# obs.	433	433	433	433
Sargan			8,30 (0,50)	

Note: Data on welfare benefits are from 'Sosialstatistikk', Statistics Norway. Standard errors in parentheses. ***, ** and * denotes significance at 1%, 5% and 10% level respectively. A constant term is included in all regressions (not reported). Sargan (1958) test with 9 degrees of freedom, p-value in parenthesis.

Appendix Table 1: Data description and descriptive statistics – Mean and standard deviations

Variable	Description	Mean (st.dev)
b	Expected welfare benefits per standard recipient per year in 1000 NOK. The standardized reference person is a single, Norwegian man, 16-30 years old, not disabled, not long-term unemployed, low education, pays no maintenance, receives no basic and supplementary benefits, 1998. The variable is estimated and documented by Langørgen and Rønningen (2003).	30,058 (1,646)
bn	Reported welfare benefit norms for single persons, per month measured in 1000 NOK. Source: 'Sosialstatistikk', Statistics Norway.	3,966 (0,607)
$\overline{y}$	Average gross income for every person 17 years and older, measured in 1000 NOK.	184,476 (21,354)
$\frac{y_m}{\overline{y}}$	Income distribution measured as the ratio of median to mean income.	0,82 (0,05)
g	The sum of lump-sum grants from the central government and regulated income and wealth taxes, measured in 1000 NOK per capita.	22,968 (6,031)
N	Total population (1st of January 1998).	9048 (17094)
ch	The share of the population 0-5 years (1st of January 1998).	0,079 (0,011)
yo	The share of the population 6-15 years (1st of January 1998).	0,133 (0,015)
el	The share of the population 67 years and above (1st of January 1998).	0,158 (0,036)
soc	The share of socialist representatives in the local council. A socialist is defined as a representative belonging to one of the following parties: NKP, RV, SV and AP.	0,374 (0,142)
sqm price	Average municipal housing price per square meter in 1000 NOK. The price is computed for used freeholder houses in 1998. For municipalities with few transactions (5 or less) the average price is replaced with a county average for municipalities of the same size.	5,027 (1,538)
housing incl.	Dummy equal 1 if support to housing is included in bn.	0,067 (0,25)

Appendix Table 2: Descriptives of the endogenous variables

	Minimum	1st quartile	Median	3rd quartile	Maximum	Average (st.deviation)
b	24,060	28,937	30,079	31,132	35,596	30,059 (1,650)
bn	2,258	3,540	3,930	4,335	6,441	3,969 (0,613)

Note: b is expected welfare benefit per standard recipient per year in 1000 NOK and bn is welfare benefit norm for single persons per month in 1000 NOK, N=433.

Appendix Table 3: Welfare benefit according to county, standard deviation and coefficient of variation

County	b	St.dev	Var-coeff	#	bn	St.dev	Var-coeff	#
Østfold	30.938	1.166	0.038	18	3.638	0.323	0.089	18
Akershus	29.604	0.950	0.032	22	3.800	0.366	0.096	22
Hedmark	31.075	1.413	0.045	22	4.092	0.479	0.117	22
Oppland	30.778	1.334	0.043	26	4.049	0.500	0.123	26
Buskerud	29.904	0.997	0.033	21	3.175	0.312	0.098	21
Vestfold	30.791	1.720	0.056	15	3.858	0.341	0.088	15
Telemark	30.923	1.365	0.044	18	3.382	0.396	0.117	18
Aust-Agder	31.626	1.724	0.055	15	3.875	0.525	0.136	15
Vest-Agder	29.616	1.365	0.046	15	3.754	0.529	0.141	15
Rogaland	28.543	1.539	0.054	25	4.237	0.511	0.121	25
Hordaland	29.831	1.539	0.052	34	4.025	0.536	0.133	34
Sogn og Fjordane	29.513	1.924	0.065	26	4.330	0.801	0.185	26
Møre og Romsdal	28.959	1.432	0.049	38	4.077	0.684	0.168	38
Sør-Trøndelag	29.317	0.991	0.034	25	4.092	0.416	0.102	25
Nord-Trøndelag	30.249	1.373	0.045	24	4.164	0.591	0.142	24
Nordland	30.565	1.673	0.055	45	3.956	0.549	0.139	45
Troms	29.555	1.880	0.064	25	3.976	0.687	0.173	25
Finmark	31.027	1.134	0.037	19	4.375	0.736	0.168	19
Overall	**30.059**	**1.646**	**0.055**	**433**	**3.966**	**0.607**	**0.153**	**433**

Note: Coefficient of variation (Var-coeff) is standard deviation divided by mean