Jon Hernes Fiva

An Empirical Analysis of Decentralization, Fiscal Competition and Welfare Policy

Thesis for the degree philosophiae doctor
Trondheim, November 2006

Norwegian University of Science and Technology
Faculty of Social Sciences and Technology Management
Department of Economics

NTNU
Innovation and Creativity

NTNU
Norwegian University of Science and Technology

Thesis for the degree philosophiae doctor

Faculty of Social Sciences and Technology Management
Department of Economics

ISBN 82-471-8008-1 (printed version)
ISBN 82-471-8007-3 (electronic version)
ISSN 1503-8181

Doctoral theses at NTNU, 2006:124

Printed by NTNU-trykk

Preface

This thesis consists of an introductory chapter and four essays. The essays in Chapter 2 and 4 are joint work with my supervisor, Professor Jørn Rattsø (Norwegian University of Science and Technology). The first essay has been published in the *European Journal of Political Economy* and is reprinted here with permission from Elsevier**.** The fourth essay has been published in *FinanzArchiv* and is reprinted here with permission from Mohr Siebeck.

Acknowledgements

I am deeply indebted to Jørn Rattsø for the guidance, encouragement and support he provided throughout the completion of this work. I've learnt a lot from discussions with him and in particular I have appreciated his contagious enthusiasm. Jørn is also the co-author of two of the essays. I am also grateful to my colleagues at the Department of Economics at NTNU for providing a stimulating and friendly working environment.

In the spring term of 2005, I had the privilege to visit the Institute for Quantitative Social Science at Harvard University. I benefited a lot from participating in the arrangements at Harvard, in particular the weekly Political Economy Workshop. I am grateful for being allowed to participate in the excellent research environment. The last months, when I was finishing this thesis were spent at the Department of Economics at the University of Oslo. Their hospitality is also gratefully acknowledged. I also appreciate funding from the Norwegian Research Council under the project 'State, Local Governments and Welfare Services – Consequences of New Control Mechanisms and Financing'. Finally, I would like to express my gratitude to my family for their support and encouragement along the way.

Oslo, July 2006,

Jon Hernes Fiva

Contents

Chapter 1

Introduction and Summary

1.1. Introduction

Decentralization of the public sector is often promoted, by for instance the World Bank and the IMF, as an institution that can help solve control problems and rigidities in public sector provision and stimulate efficient provision. But as Oates (1999) points out – the proper goal of restructuring the public sector cannot be simply decentralization. This thesis addresses the major incentive mechanism of decentralized government – fiscal competition. Fiscal competition theory deals with how fiscal policymaking is affected by competitive pressures faced by governments (Wildasin, 2006).[1] Competition among governments has the potential to work as a disciplining device because it ensures that no jurisdiction is allowed to be grossly inefficient, because if it were grossly inefficient, mobile factors of production would move away. A related mechanism is yardstick competition. Rather than governments being linked through their treasuries, yardstick competition links them through the informal content of each jurisdiction's fiscal policies. In particular, policies chosen in a given jurisdiction and those in similar jurisdictions enables citizens in the former jurisdiction to comparatively evaluate the performance of government officials and vote accordingly. In the following I define fiscal competition broadly to include both classes of strategic interaction models.

While competition among companies tends to be beneficial for the general public, this is not necessarily the case for competition among governments. Key in the fiscal competition theory is that the mobility of firms and households yields incentives for governments to aim to improve their relative position through successive undercutting of tax rates and welfare state arrangements. The main concern in the theoretical fiscal competition literature has been that fiscal competition lowers government spending below their efficient levels.[2, 3] This concern is warranted if public expenditures are used by benevolent politicians to provide public services

[1] Closely related to the fiscal competition literature is the seminal Tiebout (1956) contribution. Tiebout conjectured that, analogous to free market competition, could competition among publicly elected governments for mobile households yield an efficient provision of local public goods. The key idea is that people with high demands for public services would be drawn to localities with high levels of public good provision, while people with low demands for public services would sort themselves to localities with low taxation and low spending.

[2] Fiscal competition may not only lead to inefficient levels of aggregate public expenditures, but also to systematic inefficiencies in the composition of public expenditures (Keen and Marchand, 1997).

[3] One of the early statements concerning this mechanism is found in Oates (1972, p. 143): "The result of tax competition may well be a tendency toward less than efficient levels of output of local services. In an attempt to keep taxes low to attract business investment, local officials may hold spending below those levels for which marginal benefits equal marginal costs, particularly for those programs that do not offer direct benefits to local business." Zodrow and Mieszkowski (1986) modeled how this could occur. This stands in sharp contrast to the Tiebout (1956) model where factor mobility ensures a Pareto-efficient outcome. The discrepancy is driven by the assumption in the Tiebout model that the government can charge a head tax (while only a source based tax is available in the Zodrow Mieszkowski model).

valued by the citizens. However, if politicians are self serving and use government revenues inefficiently, then factor mobility, by limiting public expenditures, also limits waste (the argument of Brennan and Buchanan, 1980). Another concern related to fiscal competition is that the mobility of resources is likely to undermine attempts by governments to redistribute income (Stigler, 1957). It follows that the normative implications of fiscal competition are not straight forward. Empirical evaluation of both the existence and consequences of fiscal competition is the central topic of this thesis. A particular focus is on fiscal competition in welfare policy.

1.2. Fiscal Competition: Empirical Approaches

Two key empirical approaches are applied to study fiscal competition among governments. The first approach follows a strand of literature initiated by Case et al. (1993) that focus on estimating fiscal reaction functions. To identify fiscal competition among governments, a reduced form equation is estimated where the policy variable in one jurisdiction (e.g. taxes) is related to a weighted average of nearby (typically contiguous) jurisdictions' policy variables. A slope coefficient in the fiscal reaction function different from zero is taken as evidence in favor of fiscal competition. Two of the essays in this thesis, which both are joint work with Jørn Rattsø, depart from the Case et al. (1993) approach in that the main focus is on fiscal reaction functions. Chapter 2 and Chapter 4 evaluate strategic interaction in welfare benefits and residential property taxation in Norway, respectively. The results confirm our theoretical priors: Strategic interaction among local governments occurs in both welfare and tax policies.

A possible interpretation of why local governments react strategically to other local governments welfare policy, is that they fear becoming a 'welfare magnet' if they are too generous compared to their peers. Encouraged by the findings in Chapter 2, Chapter 3 deals explicitly with the 'welfare migration hypothesis', aiming to answer the question: Does welfare policy affect residential choices? The main contribution of the analysis is to utilize a natural experiment to address the potential policy endogeneity. The econometric analysis shows that welfare migration does seem to occur and that this phenomenon is likely to contribute (at least partially) to the strategic interaction in welfare policy established in Chapter 2.

The second main approach applied to evaluate fiscal competition is based on Oates' (1985) seminal contribution on the association between government size and fiscal decentralization. Chapter 5 follows in this tradition and analyzes panel data on 18 OECD countries. Across these countries (but also within countries over time) the extent of fiscal decentralization differs substantially. Since jurisdictions with limited geographic scope (such as local governments) are, in general, more likely to face greater competitive pressures than larger ones (such as countries), it follows that the more fiscally decentralized countries are expected to experience stronger fiscal competition. The contribution of Chapter 5 is to add an improved measure of fiscal decentralization and to evaluate not only the size of government, but also the composition of government. I argue that how fiscal decentralization affects the composition of government can shed some light on the normative and ideological issues related to whether fiscal competition is good or ill. A brief summary of all four analyses is given below.

1.3. Summary of the Essays

Chapter 2: Welfare Competition in Norway: Norms and Expenditures

Suppose that a Norwegian local government adopts a welfare policy designed to achieve a significantly more egalitarian income distribution than exist in neighboring local governments. With mobile households this induces Tiebout sorting. Poor people would move into the generous jurisdictions, while rich people would move in the opposite direction. At the central level this problem does not occur since mobility is reduced, the larger the jurisdictions. Based on such reasoning Stigler (1957) concludes that 'redistribution is intrinsically a national policy'. Nonetheless have many countries, such as Norway, decentralized responsibility for welfare policy to take advantage of local administration and knowledge. Theoretical considerations thus suggests that local governments will choose benefit levels in a strategic fashion taking into account of the mobility of the poor and the choices of other jurisdictions. Whether such welfare competition is important in practice is an empirical issue which is addressed in this essay. Our contribution is to separate between the welfare benefit norms decided at the political level and the actual welfare benefit payments of a standardized person. Utilizing spatial econometric methods we find statistical significant and similar strategic interaction among local governments for both politicians (norm) and bureaucrats (actual benefits).

Chapter 3: Does Welfare Policy Affect Residential Choices? Evidence from a Natural Experiment

Although the analysis in Chapter 2 finds strong strategic interaction in welfare policy, an interjurisdictional interaction function is not by itself able to discriminate among competing theories of strategic interaction (Revelli, 2005). An observed spatial pattern in welfare benefits can stem from different sources: First, because politicians take into account (actual or perceived) migration responses from welfare recipients to avoid becoming 'welfare magnets'. Second, because imperfectly informed voters make use of information about political choices in close by governments (yardstick competition). Third, a spatial pattern may simply be caused by unobserved spatially correlated shocks or omission of a relevant variable which is correlated across space. To shed some light on this issue Chapter 3 evaluates actual welfare migration in Norway. This essay follows the empirical literature on welfare migration and evaluate whether generous governments attract and retain welfare recipients. The main contribution is to utilize a centrally implemented policy reform as a natural experiment. More specifically I utilize exogenous variation in changes in welfare benefits across Norwegian local governments provided by the announcement of national instructive guidelines. The econometric analysis finds results consistent with the welfare migration hypothesis only when the policy endogeneity is properly addressed. The bias due to policy endogeneity and the size of the welfare migration effects suggests that policymakers worry about 'welfare magnetism'. It follows that the spatial pattern found in Chapter 2 is likely to be driven (at least partially) by this concern.

Chapter 4: Local Choice of Property Taxation: Evidence from Norway

Recent theoretical contributions by Glaeser (1996) and Hoxby (1999) suggest favorable incentive effects of residential property taxation. Glaeser (1996) compares the effectiveness of a property tax in providing a link between the budget available to local officials and their choices of public good provision. When housing demand is inelastic property taxation reduces waste compared to lump sum taxation because the bureaucrats take into account the feedback via increased property values. Hoxby (1999) argues that this link can also improve official's effort, making public production more efficient. The Norwegian setting is very well suited to empirically testing the hypothesis that residential property taxation improves public sector performance because we can compare similar local governments with and without property

taxation. Fiva and Rønning (2006) utilize a well suited data set from the educational sector in Norway and find evidence in favor of the hypothesis put forward by Glaeser (1996) and Hoxby (1999). Chapter 4 addresses whether political control problems influence the *choice* of having property taxation. When property taxation can help control government officials, property taxation will be more desired the larger the imperfections of the system. We focus on one of the main sources of political inefficiency, namely political fragmentation (Roubini and Sachs, 1989). In addition we evaluate whether the choice of property taxation is influenced by yardstick competition. The results show that both mechanisms are relevant. Yardstick competition generates a distinct geographic pattern and political fragmentation seems to motivate property taxation to control common pool problems.

Chapter 5: New Evidence on the Effect of Fiscal Decentralization on the Size and Composition of Government Spending

Chapter 5 argues that one way of addressing the normative issues related to fiscal competition is to look into the composition of government spending. In particular you would expect government spending which is redistributive in nature to be highly affected by fiscal competition, even in the absence of inefficient government (Musgrave, 1959, Stigler, 1957). Chapter 5 also addresses the precise institutional incentives created by different forms of decentralization. Most importantly, if decentralization is to have a constraining effect on the size of government, it must occur on both the expenditure and revenue side of the budget. This is related to a major issue in the more recent fiscal federalism literature known as vertical fiscal imbalance. Sub-central governments that operate under the expectation that their fiscal deficits will be bailed out by the central government need not "keep their fiscal houses in order" (Oates, 2006). The final contribution of this essay is to utilize an improved measure of fiscal decentralization. This data set distinguishes between different kinds of sub-central government revenue according to the degree of discretion sub-central governments have on determining them autonomously. Interestingly the analysis shows that 'transfer spending' and 'government consumption' seem to be differently affected by fiscal decentralization. Decentralization of taxing powers is associated with less transfer spending, but unrelated to government consumption. Decentralization of spending powers is associated with increased government consumption, but unrelated to transfer spending.

1.4. Discussion and Future Research Agendas

A general worry with spatial interaction models in general, and Chapter 2 and Chapter 4 in specific, is that the spatial pattern observed is not driven by interaction, but simply 'reflection' (Manski, 1993). The main threat for obtaining valid estimates is that the neighbors' control variables, which typically are used as instruments, have a direct impact on the policy chosen in the jurisdiction considered. If this is the case, they are invalid as instruments and should be included in the second stage regression, rather than in the first stage regression.[4] A key challenge for future research is to investigate closer whether this is a relevant critique. I believe three different strategies are likely to prove useful in separating 'interaction' from 'reflection' in future research. The first and most obvious solution to this problem is to apply other instrumental variables. Ideal instrumental variables provide exogenous variation in neighboring jurisdictions policy variables that are clearly identified and understood. Dahlberg and Edmark (2004) pursue such a strategy studying strategic interaction in welfare benefits in Sweden in a similar fashion to Chapter 2. They take advantage of what they argue is an exogenous placement of a highly welfare prone group (refugees) across Swedish municipalities. Utilizing this natural experiment they find similar strategic interaction effects as when they apply neighboring characteristics as instruments. Although it is comforting that the identification strategies relying on neighboring jurisdictions' characteristics do not seem to give rise to biased results, further research along the lines of Dahlberg and Edmark (2004) is warranted to establish whether it is reasonable to treat neighbor's control variables as valid instruments.[5] A second approach is to rely on auxiliary predictions derived directly from fiscal competition theory. For example, it is possible to shed some light on whether the spatial pattern in welfare benefits found in Chapter 2 is actually driven by a fear of becoming 'welfare magnets' by testing whether 'welfare migration' is in fact taking place (the strategy followed in Chapter 3). Another example is the estimation of 'popularity equations' in yardstick competition models (e.g. Besley and Case, 1995). A final approach would be to introduce some interaction terms into the spatial regression, where indirect predictions from theories of fiscal competition can distinguish 'interaction' from 'reflection'. Several studies

[4] With more instruments than endogenous variables, it is possible to test the validity of the instruments with an overidentifying restrictions test. Although the overidentifying restrictions test does provide some information on the validity of the instruments, it is widely acknowledged that it has low power in certain settings (see e.g. Newey, 1985).

[5] Note that specification tests for spatial autocorrelation proposed by Anselin et al. (1996) may also prove helpful in distinguishing spatial lag dependence from spatial error dependence and consequently 'interaction' from 'reflection'.

have for example included interaction terms consisting of the spatially lagged dependent variable and variables describing the electoral process (term limits, electoral margins and dummies for election year) to separate yardstick competition from tax base competition. These models can also be estimated with Maximum Likelihood methods.

Another challenging and unresolved issue related to the fiscal competition literature is the associated welfare consequences. On one side of the debate are economists who argue that fiscal competition limits the inefficiencies of governmental bureaucracy and encourages governments to allocate resources efficiently. On the other side are economists who argue that competition among governments amount to little more than a zero-sum game in which governments squander resources chasing after a mobile tax base leading to an erosion of welfare state arrangements. Given the competing theories, the welfare consequences of government competition become an empirical question.[6] One approach to assess the welfare consequences of fiscal competition is suggested in Chapter 5. The idea is that *how* fiscal decentralization (and consequently fiscal competition) affects the *composition* of government spending can provide some valuable insight into the normative implications of fiscal competition. As a first investigation, this analysis divides government spending into two categories, transfer spending and government consumption. Decentralization of taxing powers yields less transfer spending, but not less government consumption. Since fiscal competition is likely to put a downward pressure on redistributive spending also in the absence of inefficient government, one may speculate that fiscal decentralization does not act as a powerful instrument to prevent policy makers from wasting resources. A further refinement of the composition of government may be able to better examine whether this is valid reasoning.

The welfare consequences of fiscal competition do not necessarily have to be evaluated within countries. Some economists are worried that increasing mobility of firms and workers may give rise to competitive forces, leading the European countries to move in the direction of the US social security system. The realism of such a scenario is not clear. One potential approach to assess the importance of fiscal competition among EU countries is to rely on a spatial interaction model. The huge cross section heterogeneity is however likely to be a confounding factor. It is probably more fruitful to evaluate auxiliary predictions derived from theory. One approach would be to focus on the *tools* available to national governments, e.g. 'Has closer

[6] Although theoretical work along the lines of Edwards and Keen (1996) may be helpful.

European integration lead to a shift in taxation from mobile to less mobile tax bases?'. Another approach would be to focus on the *outcome* of increased fiscal competition: e.g. 'has closer European integration lead to welfare state arrangements that do a poorer job at reducing inequality?'. These questions, interesting in their own right, may also shed some light on the welfare consequences of fiscal competition.

References

Anselin, Luc, Anil K. Bera, Raymond Florax and Mann J. Yoon (1996): "Simple Diagnostic Tests for Spatial Dependence", Regional Science and Urban Economics 26, 77-104.

Besley, Tim and Anne Case (1995): "Incumbent Behavior: Vote Seeking, Tax Setting and Yardstick Competition", American Economic Review 85, 25-45.

Brennan, Geoffrey and James Buchanan (1980): *The Power to Tax*, Cambridge: Cambridge University Press.

Case, Anne C., Harvey S. Rosen and James R. Hines (1993): "Budget Spillovers and Fiscal Policy Interdependence", Journal of Public Economics 52, 285-307.

Dahlberg, Matz and Karin Edmark (2004): "Is there a 'Race-to-the-Bottom' in the Setting of Welfare Benefit Levels? Evidence from a Policy Intervention", Working Paper 2004:19, Department of Economics, Uppsala University.

Edwards, Jeremy and Michael Keen (1996): "Tax Competition and Leviathan", European Economic Review 40, 113-134.

Fiva, Jon H. and M. Rønning (2006): "The Incentive Effects of Property Taxation: Evidence from Norwegian School Districts", Discussion Paper No. 484, Statistics Norway.

Glaeser, Edward (1996): "The Incentive Effects of Property Taxes on Local Governments", Public Choice 89, 93-111.

Hoxby, Caroline M. (1999): "The Productivity of Schools and Other Local Public Goods Producers", Journal of Public Economics 74, 1-30.

Keen, Michael and Maurice Marchand (1997): "Fiscal Competition and the Pattern of Public Spending", Journal of Public Economics 66, 33-53.

Manski, Charles F. (1993): "Identification of Endogenous Social Effects: The Reflection Problem", Review of Economic Studies 60, 531-542.

Musgrave, Richard (1959): *The Theory of Public Finance*, McGraw-Hill, New York.

Newey, Whitney (1985): "Generalized Method of Moments Specification Testing", Journal of Econometrics 29, 229-256.

Oates, Wallace (1972): *Fiscal Federalism,* Harcourt, New York.

Oates, Wallace (1985): "Searching for Leviathan: An Empirical Study", American Economic Review 75, 748-757.

Oates, Wallace (1999): "An Essay on Fiscal Federalism", Journal of Economic Literature 37, 1120-1149.

Oates, Wallace (2006): "On the Theory and Practice of Fiscal Decentralization", Institute for Federalism & Intergovernmental Relations Working Paper No. 2006-5.

Revelli, Federico (2005): "On Spatial Public Finance Empirics", International Tax and Public Finance 12, 475-492.

Roubini, Nouriel and Jeffrey D. Sachs (1989): "Political an Economic Determinants of Budget Deficits in the Industrial Democracies", European Economic Review 33, 903-938.

Stigler, George J. (1957): "The Tenable Range of Functions of Local Government", in US Congress Joint Economic Committee (ed.), *Federal Expenditure Policy for Economic Growth and Stability*, 213-219, Washington DC.

Tiebout, Charles M. (1956): "A Pure Theory of Local Expenditures", Journal of Political Economy 64, 416-424.

Wildasin, David E. (2006): "Fiscal Competition", in Weingast, Barry R. and Donald Wittman (eds.), *The Oxford Handbook of Political Economy*, Oxford University Press, Oxford, UK.

Zodrow, George R. and Peter M. Mieszkowski (1986): "Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods", Journal of Urban Economics 19, 356-370.

Chapter 2

Welfare Competition in Norway: Norms and Expenditures

Available online at www.sciencedirect.com
SCIENCE DIRECT®
European Journal of Political Economy
Vol. 22 (2006) 202–222
European Journal of POLITICAL ECONOMY
www.elsevier.com/locate/ejpe

Welfare competition in Norway: Norms and expenditures

Jon H. Fiva, Jørn Rattsø *

Department of Economics and Center for Economic Research (SØF), Norwegian University of Science and Technology, N-7491 Trondheim, Norway

Received 12 July 2004; received in revised form 21 March 2005; accepted 12 April 2005
Available online 2 August 2005

Abstract

This paper evaluates the empirical importance of welfare competition. Our contribution is to separate the welfare benefit norm decided at the political level from the actual welfare benefit payments of a standardized person. Utilizing spatial econometric methods, we find statistical significant and similar strategic interaction between local governments for both politicians (norm) and bureaucrats (actual benefits). We do not find support for an income effect representing altruism, which is the standard explanation for welfare benefits in the theoretical literature. The strategic interaction and geographic pattern identified do not necessarily imply underprovision, since the grant financing of the local governments may generate overall excessive public spending.

JEL classification: C21; D78; H73
Keywords: Welfare benefits; Fiscal competition; Strategic interaction; Spatial econometrics

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 such as ‘can the welfare state survive?’ and with propositions of a ‘race to the bottom’. The issue

* Corresponding author. Tel.: +47 73591934; fax: +47 73596954.
E-mail address: jorn.rattso@svt.ntnu.no (J. Rattsø).

0176-2680/$ - see front matter © 2005 Elsevier B.V. All rights rseved.
doi:10.1016/j.ejpoleco.2005.04.007

has raised policy concern about fiscal decentralization and in particular about EU integration. Sinn (1994) has warned about the consequences of economic integration for welfare policy. Nannestad (2004) describes how immigration challenges the Danish welfare state.

A large literature initiated by Musgrave (1959) and Stigler (1957) warns 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 may give an incentive to reduce redistribution. The comprehensive theoretical literature is not matched by much empirical evidence. It should also be noticed that welfare competition may arise even without mobility. 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 that it matters for policy.

In the domain of welfare policy, countries have typically decentralized responsibilities to states and municipalities, to take advantage of local administration and knowledge. The associated welfare competition may threaten 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 U.S. studies summarized by Brueckner (2000) and in recent studies of the UK (Revelli, 2004) 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 from actual welfare payments. We also throw light on the importance of the local income level, the altruism effect that dominates the theoretical literature.

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 U.S. 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., 1999; 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 by Bailey and Rom (2004) for the U.S., Revelli (2004) 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.

The relationship between politically determined norms and actual welfare payments to the clients represent a key linkage in the public choice literature between politics and bureaucracy. Under an assumption of rationality, the local politicians will take into account bureaucratic behavior when norms are set. The variation in both norms and

actual benefits are investigated below. The norms are set as guidelines for the administration and are specified as an amount paid to a 'standard user' (single individual without children) per month. The estimates of welfare competition in norms reflect the political response.

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 (2004). They utilize data for most of the adult 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 to quite permanent welfare clients. The expected benefit measure is an attempt to take into account this heterogeneity.

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 depends on benefits in neighboring municipalities as well as on 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 presents and discusses our estimated interaction models, and Section 6 discusses other determinants of welfare benefits. A short summary of results and challenges for future research are presented 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 mobility, 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

[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.

function. The mobility of the poor is a source of inefficiency in decentralized systems. The extensive theoretical literature on mobility and redistribution is summarized by Cremer and Pestieau (2004).

A simple and attractive theoretical framework relevant for our analysis is set 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 U.S. studies assumes wage adjustment. Brueckner (2000) presents the adjustment mechanism based on Wildasin (1991), which is 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 U.S. evidence, that there is welfare induced migration but that it is modest in magnitude. There are serious methodological challenges to identifying welfare migration. Actual migration flows may be small because municipalities respond to the competitive pressure. When local governments harmonize their welfare benefit levels to avoid in-migration of welfare recipients, the incentives to move are reduced. It follows that welfare competition may be important even when welfare migration is negligible.

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. Other rationales for redistribution to the poor can be argued. The marginal benefit of redistribution may increase with income due to a desire to reduce the negative externalities attached to poverty (such as crime, etc). Redistribution is 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 control variable here.

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:

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

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

Strategic interaction is known as spatial autocorrelation in the econometric literature. 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]

$$\boldsymbol{b} = \alpha \mathbf{W}\boldsymbol{b} + \mathbf{x}\boldsymbol{\beta} + \boldsymbol{u} \tag{2}$$

where $\boldsymbol{b}$ is a vector of welfare benefit levels, $\mathbf{W}$ is the spatial weights matrix, $\mathbf{x}$ is a matrix of welfare benefit determinants of every municipality, $\boldsymbol{\beta}$ is a vector of parameters and $\boldsymbol{u}$ is a vector of iid error terms with variance $\sigma^2_{\boldsymbol{u}}$. For each municipality $\mathbf{W}$ assigns municipalities of reference (referred to as 'neighbors' in the literature) and their relative weights. The weights are determined a priori 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 $\mathbf{W}$ are row-standardized, such that for each i, $\sum_j w_{ij} = 1$.[3] Then $\mathbf{W}\boldsymbol{b}$ 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 $\mathbf{W}\boldsymbol{b}$ 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:

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

implying that

$$E((\mathbf{W}\boldsymbol{b})\boldsymbol{u}') = \mathbf{W}(\mathbf{I} - \alpha\mathbf{W})^{-1}\sigma^2_{\boldsymbol{u}} \neq 0. \tag{4}$$

When the welfare benefit levels of the municipalities are potentially interdependent, we must model the determination of benefits as simultaneous. Standard Ordinary Least Squares (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. We can either estimate the reduced-form Eq. (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 is 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 $\mathbf{Wx}$ as instruments. This is in line with what Besley and Case (1995) and Figlio et al. (1999) among others do. However, realizing that invalid

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

[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).

[4] Valid instruments are correlated with $\mathbf{W}\boldsymbol{b}$, but uncorrelated with the error terms from (2).

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 (2004) 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:

$$\boldsymbol{u} = \lambda \mathbf{M}\boldsymbol{u} + \varepsilon \tag{5}$$

where ε is a well behaved error vector and $\mathbf{M}$ is a neighbor matrix. ML estimation that assumes that $\boldsymbol{u}$ is iid yields in this case biased estimates. Estimating such a model can in principle lead to a false conclusion of welfare competition ($\alpha > 0$) when $\alpha = 0$ 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 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 Eqs. (1) and (2):

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

We apply a set of K control variables.[6] The discussion in Section 3 includes two key demand variables, the average private income level ($\bar{y}$) and a measure of the income distribution (τ). The skewness of the income distribution is represented by the ratio of median to mean income $(y_m/\bar{y})$. 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

[5] Consider for example the case where the error term is given by (5) and there is no strategic interaction ($\alpha = 0$). Assuming that $\mathbf{M} = \mathbf{W}$ and substituting (5) into (2) yields in this case: $\boldsymbol{b} = \lambda \mathbf{W}\boldsymbol{b} + \mathbf{x}\beta - \lambda \mathbf{W}\mathbf{x}\beta + \varepsilon$. Note that except for the extra term, $-\lambda \mathbf{W}\mathbf{x}\beta$, 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 $\mathbf{W}\boldsymbol{b}$ and we may falsely reject the null hypothesis of no strategic interaction.

[6] The first stage regression is given by: $\sum_{j=1}^{n} \hat{w}_{ij} b_j = \gamma + \sum_{k=1}^{K} v_k \sum_{j=1}^{n} w_{ij} CONTROL_{kj} + \sum_{k=1}^{K} \eta_k CONTROL_{ki}$, where γ, v_k and η_k are $2 * K + 1$ parameters to be estimated.

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 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 million 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 highly 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 cash benefits. The benefits are meant to cover basic food, clothing and housing. The long-term recipients, about 60,000 in all, are dominated by young drug addicts and grown up unemployed without unemployment benefits. Short-term recipients are young and old unemployed with better connections to the labor market. 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 low per capita income tax revenues are compensated by about 90% below the average. The second is expenditure equalization where characteristics of the population (in particular age

[7] Description of variables and descriptive statistics are found in Appendix Table A.1.

[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.

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 the challenge 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 A.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 (2004) 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 measured in 1000 NOK per year.[9] The variation is described in Appendix Table A.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).

5. Estimated welfare competition

Empirical evidence of 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 A.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:

$$I = \boldsymbol{u}'W\boldsymbol{u}/\boldsymbol{u}'\boldsymbol{u} \tag{7}$$

where $\boldsymbol{u}$ is a vector of OLS residuals and $\mathbf{W}$ 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. Leaving out the strategic interaction term in Eq. (6) and estimating the model by OLS (reported as model A in Tables 2 and 3), 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 can reject the null hypothesis of absence of spatial autocorrelation. Note that the Moran test cannot say

[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.

Table 1
Tests for spatial dependence

	Expected welfare benefits (b)	Welfare benefit norm (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)

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.

whether it is spatial lag dependence or spatial error dependence that is the driving force behind the spatial pattern. Anselin et al. (1996) have 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).[10] Results from the robust LM-tests based on our OLS regressions for our two measures of welfare benefits are reported in Table 1.

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 test for spatial error dependence, and both the regular and the robust test for spatial lag dependence are significant, then there is strong evidence for spatial lag dependence (Anselin et al., 1996, p.97). 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 give the best description of the geographic pattern. We cannot completely eliminate the possibility of error dependence and hence the ML estimates reported below may be biased.[11] A strength with the IV approach is that it yields estimates that are robust to the presence of spatial error dependence, given that the instruments are properly chosen, as discussed in Section 3. For the 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

[10] 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.

[11] 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.

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

	A OLS	B OLS	C IV	D ML
spatial lag (α)		0.61*** (0.08)	0.80*** (0.19)	0.39*** (0.06)
$\bar{y}$	−0.033*** (0.006)	−0.023*** (0.006)	−0.020*** (0.007)	−0.027*** (0.006)
$\frac{y_m}{\bar{y}}$	−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*** (10.20)	−14.40 (9.57)	−10.65 (10.24)	−18.86** (9.45)
yo	−8.05 (6.97)	−5.41 (6.49)	−4.61 (6.58)	−6.36 (6.48)
el	−12.59*** (3.89)	−7.79** (3.67)	−6.33 (3.92)	−9.51*** (3.62)
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_{adj}	0.117	0.236		
# obs.	433	433	433	433
Sargan[a]			7.13 (0.52)	

Data on welfare benefits are from Langørgen and Rønningen (2004), 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).

[a] Sargan (1958) test with 8 degrees of freedom, p-value in parenthesis.

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.[12] 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

[12] The number of neighbors range 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.

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

	A OLS	B OLS	C IV	D ML
spatial lag (α)		0.59*** (0.08)	0.81*** (0.18)	0.36*** (0.06)
$\bar{y}$	−0.003 (0.002)	−0.002 (0.002)	−0.001 (0.002)	−0.002 (0.002)
$\frac{y_m}{\bar{y}}$	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_{adj}	0.135	0.229		
# obs.	433	433	433	433
Sargan[a]			8.30 (0.50)	

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).

[a] Sargan (1958) test with 9 degrees of freedom, p-value in parenthesis.

this negative effect dominates in our case.[13] 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.

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.

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

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

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 U.S. 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 U.S. evidence, including studies addressing welfare migration. We only know two studies outside the U.S. states. Revelli (2004) 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. Other determinants of welfare benefits

The theoretical models of welfare competition discussed in Section 2 emphasize the level of private income as a determinant of welfare benefits, and that redistribution is motivated by altruism. Higher private income levels are associated with a higher welfare benefit level. Our estimates do not support the altruism theory. 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. Finnmark, on the other hand, has low private income level, more variation across municipalities, and generally high welfare benefits.

We have investigated the income effect further by using instruments. It can be argued that the private income level is endogenous and affected by the mobility of welfare

clients. If a low income level reflects many poor and potential welfare clients, the negative income effect may reflect the supply of poor. The private income level is instrumented with 8 variables representing the industrial structure (labor shares in 8 groups of industries). The strategic interaction is reproduced in this case, and only the statistical significance of the income effect is affected. The negative income effect for the actual benefits is now not statistically significant, while the negative income effect for the benefit norm is significant.

The empirical literature, as summarized by Ribar and Wilhelm (1999) for U.S. welfare benefits, is inconclusive regarding income effects. Analyses in general 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, p.492). This rationale to redistribute might be driving our negative impact of private income on expected welfare benefits.

In addition to this possible interpretation, we direct 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, Finnmark has local government revenue per capita 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 control for the importance of the income distribution. The empirical literature investigating the Meltzer–Richards hypothesis has focused 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 believe 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 U.S. 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 taxes 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 as measured by the ratio of median to mean income. 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. We find a positive relationship between equality and the welfare benefit

norms, reported in Table 3, and the effect is statistically significant in the OLS and ML 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) for the U.S. 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 of representation in the local council. Ideology has been 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, that a 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 represents those including such costs (raising the norm by approximately NOK 460 per month).

7. Concluding remarks

When the allocation of welfare benefits is decentralized to local governments, incentives for welfare migration are created that 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 the policy decision from the actual welfare benefit payments. The former is the welfare benefit norm decided by the local council, while the latter is based on individual data and is calculated as 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 have utilized spatial econometric

methods in specifying a reaction function in which the welfare benefit level in one municipality depends 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 the effect is of the same size. It follows that welfare competition is equally important for the politically determined norm and the actual welfare payments. The politicians and the bureaucrats respond in coordinated fashion.

There are differences in the determinants of the benefit levels between the two measures, however. The negative income effect seems to be somewhat stronger for the actual benefit payments than for the benefit norm. The result indicates that the bureaucrats are more responsive to income levels than the politicians. More unequal income distribution reduces the benefit norm but does not affect the actual benefit payments. A possible interpretation is that politicians react to the cost effect of more inequality but the bureaucrats do not.

In theory, welfare competition implies underprovision of welfare benefits. In the Norwegian system, the centralized grants financing of the local governments may result in overall excessive spending. It follows that we cannot say that 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 affected neighboring municipalities, nor to 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.

Acknowledgements

We are grateful to Audun Langørgen and Dag Rønningen, Statistics Norway, for making available to us their computed welfare benefit levels, funding provided by the Norwegian Research Council under the FIFOS program, and comments at the Norwegian Research Forum 2004 and the European Public Choice meeting 2004, and in particular from Roger Congleton, Matz Dahlberg, Erling Holmøy, Bjørg Langset, Federico Revelli and two anonymous referees of this journal. Except for the computed welfare benefits, data are provided by the Norwegian Social Science Data Services and

Statistics Norway. None of them are responsible for the analyses conducted or for the conclusions drawn.

Appendix A. Table A.1: Data definitions and descriptive statistics

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 (2004).	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)
$\bar{y}$	Average gross income for every person 17 years and older, measured in 1000 NOK.	184.476 (21.354)
$\frac{y_m}{\bar{y}}$	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 (17,094)
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 variable equal to 1 if support to housing is included in bn, 0 otherwise.	0.067 (0.25)

Appendix B. Table A.2: Descriptives of the endogenous variables

	Minimum	1st quartile	Median	3rd quartile	Maximum	Average (st.dev.)
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)

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 C. Table A.3: Average welfare benefits, standard deviations and coefficients of variation according to county

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

References

Alesina, A., Baqir, R., Easterly, W., 2000. Redistributive public employment. Journal of Urban Economics 48, 219–241.

Anselin, L., 2001. Spatial econometrics. In: Baltagi, B.H. (Ed.), A Companion to Theoretical Econometrics. Blackwell Publishers, Oxford, pp. 310–330.

Anselin, L., Bera, A.K., Florax, R., Yoon, M.J., 1996. Simple diagnostic tests for spatial dependence. Regional Science and Urban Economics 26, 77–104.

Bailey, M.A., Rom, M.C., 2004. A wider race? Interstate competition across health and welfare programs. Journal of Politics 66, 326–347.

Berry, W.D., Fording, R.C., Hanson, R.L., 2003. Reassessing the 'race to the bottom' in state welfare policy. Journal of Politics 65, 327–349.

Besley, T., Case, A., 1995. Incumbent behavior: vote seeking, tax setting and yardstick competition. American Economic Review 85, 25–45.

Boadway, R., Keen, M., 2000. Redistribution. In: Atkinson, A., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. I. North-Holland, Amsterdam, pp. 677–789.

Bordignon, M., Cerniglia, F., Revelli, F., 2003. In search of yardstick competition: a spatial analysis of Italian municipality property tax setting. Journal of Urban Economics 54, 199–217.

Borge, L.-E., Rattsø, J., 1995. Demographic shift, relative costs and the allocation of local public consumption in Norway. Regional Science and Urban Economics 25, 705–726.

Borge, L.-E., Rattsø, J., 2004. Income distribution and tax structure: empirical test of the Meltzer–Richard hypothesis. European Economic Review 48, 805–826.

Brown, C., Oates, W., 1987. Assistance to the poor in a federal system. Journal of Public Economics 32, 307–330.

Brueckner, J., 2000. Welfare reform and the race to the bottom: theory and evidence. Southern Economic Journal 66, 505–525.

Cremer, H., Pestieau, P., 2004. Factor mobility and redistribution. In: Henderson, V., Thiesse, J. (Eds.), Handbook of Regional and Urban Economics, vol. 4. North Holland, Amsterdam, pp. 2529–2560.

Dahlberg, M., Edmark, K., 2004. Is There a "Race-to-the-Bottom" in the Setting of Welfare Benefit Levels? Evidence From a Policy Intervention. Working Paper 2004:19, Department of Economics, Uppsala University.

Figlio, D., Kolpin, V., Reid, W., 1999. Do states play welfare games? Journal of Urban Economics 46, 437–454.

Gramlich, E.M., Laren, D.S., 1984. Migration and income redistribution responsibilities. Journal of Human Resources 19, 489–511.

Kelejian, H., Prucha, I.R., 1998. A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances. Journal of Real Estate Finance and Economics 17, 99–121.

Kelejian, H., Robinson, D., 1993. A suggested method of estimation for spatial interdependent models with auto-correlated errors, and an application to a county expenditure model. Papers in Regional Science 72, 297–312.

Langørgen, A., 1995. Faktorer bak kommunale variasjoner i utgifter til sosialhjelp og barnevern (Determinants of Variation in Local Government Spending for Welfare Benefits and Child Custody, in Norwegian). Statistics Norway Notes 95/56.

Langørgen, A., Rønningen, D., 2004. Local Government Preferences, Individual Needs, and the Allocation of Social Assistance. Discussion paper 380, Statistics Norway.

Meltzer, A., Richard, S., 1981. A rational theory of the size of government. Journal of Political Economy 89, 914–927.

Meyer, B., 2000. Do the poor move to receive higher welfare benefits. Unpublished paper, Department of Economics, Northwestern University.

Midtsundstad, T., Dahl, E., Djuve, A.B., 1999. Jakten på storbyfaktoren (Hunting the big city factor, in Norwegian). FAFO-report 319.

Moffitt, R., 2001. Policy interventions, low-level equilibria and social interactions. In: Durlauf, S., Young, P. (Eds.), Social Dynamics. MIT Press, Cambridge, MA, pp. 45–82.

Musgrave, R., 1959. The Theory of Public Finance. McGraw Hill, New York.

Nannestad, P., 2004. Immigration as a challenge to the Danish welfare state? European Journal of Political Economy 20, 755–767.

Oates, W., 1972. Fiscal Federalism. Harcourt, New York.

Orr, L.L., 1976. Income transfers as a public good: an application to AFDC. American Economic Review 66, 359–371.

Peterson, P.E., Rom, M.C., 1990. Welfare Magnets: A New Case for a National Welfare Standard. The Brookings Institution, Washington.

Revelli, F., 2004. Performance Rating and Yardstick Competition in Social Service Provision. Working Paper no. 1270, CESifo, Munich.

Ribar, D.C., Wilhelm, M.O., 1999. The demand for welfare generosity. Review of Economics and Statistics 81, 96–108.

Rodriguez, F., 1999. Does distributional skewness lead to redistribution? Evidence from the United States. Economics and Politics 11, 171–199.

Saavedra, L., 2000. A model of welfare competition with evidence from AFDC. Journal of Urban Economics 47, 248–279.

Salmon, P., 1987. Decentralization as an incentive scheme. Oxford Review of Economic Policy 3, 24–43.

Sargan, J.D., 1958. The estimation of economic relationships using instrument variables. Econometrica 26, 393–415.

Sinn, H.W., 1994. How much Europe? Subsidiarity, centralization and fiscal competition. Scottish Journal of Political Economy 41, 85–107.

Smith, P., 1991. An empirical investigation of interstate AFDC benefit competition. Public Choice 68, 217–233.

Stigler, G.J., 1957. The tenable range of functions of local governments. Joint Economic Committee, Federal Expenditure Policy for Economic Growth and Stability. Government Printing Office, Washington, D.C.

Wheaton, W., 2000. Decentralized welfare: will there be underprovision? Journal of Urban Economics 48, 536–555.

Wildasin, D., 1991. Income redistribution in a common labor market. American Economic Review 81, 757–774.

Chapter 3

Does Welfare Policy Affect Residential Choices? Evidence from a Natural Experiment

Does Welfare Policy Affect Residential Choices? Evidence from a Natural Experiment*

Jon H. Fiva

Abstract

This paper studies how changes in welfare benefit levels affect welfare recipients' residential choices. Although several empirical studies have stressed that welfare policy may affect residential choices of welfare recipients, few studies have taken into account that residential choices of welfare recipients also affect welfare policy. The main contribution of this paper is to address this policy endogeneity by utilizing a centrally implemented policy reform taking place in Norway as a natural experiment. The results are consistent with the presence of welfare migration effects. Moreover, I show that ignoring the policy endogeneity may give rise to a downward bias in the estimated migration responses.

JEL classification: I38, H73, H77, R23;
Keywords: Natural experiment, policy endogeneity, migration, welfare benefits.

* I wish to thank Fredrik Carlsen, Jørn Rattsø, and seminar participants at Statistics Norway, the Norwegian University of Science and Technology, the University of Oslo, and at the 8th ZEW summer workshop for helpful comments and suggestions. I am also grateful to Nicolas J. I. Rodriguez at the Norwegian Social Science Data Service for providing the data, and for funding from the Norwegian Research Council.

1. Introduction

A large body of literature in public finance going back to Stigler (1957) and Musgrave (1959) has warned against the consequences of decentralized responsibility for redistribution due to household mobility. The basic argument is that policies that are redistributive in nature give rise to a phenomenon that resembles adverse selection: net beneficiaries of redistributive policies are attracted to generous jurisdictions, while net contributors are repelled. It follows that jurisdictions have incentives to behave strategically in their welfare policy to avoid becoming 'welfare magnets'. Because the concern about welfare migration limits welfare provision in all jurisdictions, no jurisdiction succeeds in repelling welfare recipients and the equilibrium is characterized by all jurisdictions setting lower benefits than they would in the (hypothetical) no-mobility case (Wildasin, 1991).[1] Such reasoning has lead Stigler and other scholars to the conclusion that "redistribution is intrinsically a national policy" (Stigler, 1957, p. 217). Another argument often posed in favor of centralized responsibility for redistribution is that the well-being of the poor is a national concern, i.e., a national public good (Brown and Oates, 1987). However, there are also potential benefits to reap from decentralized responsibility for redistribution. A decentralized system may for example be better able to tailor (appropriate) benefits to those that are truly in need and may be better for maintaining bureaucratic control.[2] In designing a well-functioning public sector one needs to trade these potential benefits of decentralization with the welfare costs related to welfare migration. It follows that theoretical models that rely on different assumptions on household mobility (in response to fiscal parameters) are likely to have different implications for assignment of redistributive policy across different tiers of government. From a normative perspective then, it is interesting to evaluate whether welfare migration is important in practice. This is the object of the current analysis. Looking for evidence in favor of welfare migration, I aim to answer this question: Do jurisdictions that offer higher welfare benefits attract poor people who would not otherwise move there and retain poor people who might otherwise have chosen to leave? I refer to this as the 'welfare migration hypothesis'.

The existing literature on the welfare migration hypothesis is primarily based on cross-sectional variation in welfare benefits across US states. The early studies have provided

[1] This phenomenon is sometimes referred to as a 'race to the bottom' in welfare policy. This term is somewhat misleading since theoretical models of fiscal competition typically do not suggest an intense race to the bottom, but a general downward pressure on redistributive activity.
[2] These and other aspects are discussed in detail by Ladd and Doolittle (1982).

conflicting and inconclusive results as to whether welfare recipients respond to (changes in) welfare benefit levels by relocating. These studies are however plagued by several methodological problems, discussed by, for example, Bailey (2005), McKinnish (2005), and Meyer (2000). Some of the very recent studies on the welfare migration hypothesis have added to the welfare migration literature by applying more sophisticated identification strategies than previous studies and have confirmed the existence of welfare migration. Bailey (2005) stressed that many studies risk distorting the effect of welfare on migration decisions by inadequately accounting for attributes of the jurisdictions that affect migration. He demonstrates that some previous studies that failed to find any welfare migration effect suffered from specification errors. Applying a more rigorous estimation strategy than many previous analyses, in particular by including state fixed effects and a control group, which helped to soak up (unobserved) confounding factors, he found evidence in favor of the welfare migration hypothesis. Gelbach (2004) pointed out that the incentives to migrate for welfare benefits are highest when a mother's children are young, as there is a longer period of welfare benefit eligibility in the US. He found that for single women with less than a college degree, their own state's welfare benefits affected residential decisions and that effects were decreasing in the age of the oldest child. The interaction effect was not present for a comparison group of mothers with college degrees. McKinnish (2005, 2006) introduced another clever identification strategy. She compared welfare program size in border counties to interior counties within US states. The key assumption made is that costs of between-state migration are lower for individuals located close to state borders. It follows that it is reasonable to expect that at state borders with a large cross-border benefit differential, the border counties on the high (low) benefit side should have higher (lower) welfare participation relative to the interior counties of the high (low) benefit state. This is exactly what McKinnish (2005) found, utilizing aggregate county level data. Consistent results are found when micro level data on migration decisions are used (McKinnish, 2006).

A closely related literature has focused on the strategic interaction among jurisdictions in the determination of welfare policy. If a jurisdiction is concerned about becoming a 'welfare magnet', then benefit levels in other (typically close by) jurisdictions will affect the jurisdiction's own benefit choice. Evidence of strategic interaction in welfare policy among jurisdictions, i.e. welfare competition, thus provides indirect evidence that the welfare migration hypothesis is correct. Both US studies, summarized by Brueckner (2000), and European studies, such as Fiva and Rattsø (2006) studying Norwegian local governments,

have found results consistent with the welfare competition hypothesis.[3] Jurisdictions seem indeed to be playing a 'welfare game', suggesting that studies of welfare migration should pay close attention to policy endogeneity. Surprisingly, the existing literature does not follow this recommendation. Almost all existing studies rely purely on cross-sectional variation in welfare benefits to identify welfare migration effects. However, if welfare benefits affect residential decisions of the poor, then residential choices of the poor are likely to affect how benefit levels are set (Moffit, 1992). It follows that studies taking variation in welfare benefits as exogenous may obtain biased and inconsistent parameter estimates. Since rational politicians are likely to respond to increased inflow of welfare recipients by lowering welfare benefits, a downward bias in studies that neglect this problem, such as Bailey (2005), Gelbach (2004), and McKinnish (2006), can be expected.[4]

The current paper adds to the welfare migration literature by evaluating aggregate migration flows of welfare recipients across local governments in Norway. The main contribution is to address the potential endogeneity problem by utilizing a centrally implemented policy reform as a natural experiment. More specifically, I utilize exogenous variation in welfare benefits across Norwegian local governments provided by an announcement of national guidelines taking place in 2001. The econometric analysis applies a conventional difference-in-differences strategy in which I evaluate whether changes in welfare benefits are positively associated with changes in net inflow of welfare recipients relative to a control group. The results from the econometric analysis are consistent with the welfare migration hypothesis and more importantly, suggest that ignoring the policy endogeneity exerts a downward bias in the estimated welfare migration effect.

The structure of the paper is as follows. The next section presents the institutional setting and the data set analyzed. Section 3 presents the empirical strategy and discusses potential problems with earlier work. The results are presented and discussed in Section 4. Section 5 concludes the paper.

[3] Note that it is empirically challenging to separate strategic interaction in welfare policy due to mobility pressure from other sources of strategic interaction (notably yardstick competition). Welfare competition may also occur if policy makers believe in the welfare migration hypothesis, even in the absence of conclusive evidence.

[4] Policy endogeneity is less likely to be a problem for McKinnish (2005a) since welfare migration effects are estimated by comparing welfare caseloads at state borders to state interiors, but this identification strategy only allows identification of short distance welfare migration effects.

2. Institutional Structure and Data

While the existing literature on the welfare migration hypothesis has studied data from the US, the current analysis utilizes data from another country with decentralized welfare policy, Norway. The welfare benefit system is the final safety net for those who fall through the gaps of other arrangements of the Norwegian welfare system and is intended to provide temporary support to people in need. The Social Service Act represents the regulations in force and states criteria and guidelines for the welfare benefits granted by local governments. The Social Service Act leaves considerable discretion to local governments concerning the generosity of the system, regarding both eligibility and the level of the benefits.

The local governments are democratic institutions led by an elected local council. Their main responsibilities concern preschool, primary and lower secondary education, and care for the elderly. Financing of local governments is highly centralized with around 90% of local government revenue coming from regulated income taxation and grants from the central government. Local governments have some discretion related to user charges and property taxation, which are important additional revenue sources on the margin. The grants are distributed as block grants and are based on objective criteria, partly as income tax equalization and partly as spending equalization. It follows that local governments do not face the full economic consequences of welfare migration.

2.1. Welfare Benefits

The implementation of welfare policies includes guidelines set by the local council and actual payments made by the welfare bureaucracy. The politically determined norms are defined as the amounts paid to 'standard users' per month. As emphasized by Fiva and Rattsø (2006), the link between politically determined norms and actual welfare payments is not trivial. The unique data set utilized by Fiva and Rattsø (2006) on actual payments for a 'standardized household' is only available for one year (1998). In this analysis I rely on the politically determined norms for single households to reflect welfare generosity. The politically determined norms are likely to be the most visible measure of welfare policy from the perspective of potential welfare immigrants and consequently appear well suited for a study of the welfare migration hypothesis.

Data on welfare benefit norms are available from 1993 onwards. However, there are quite a few observations missing from the two first years of data collection, and consequently I limit the analysis to the period 1995 to 2004. Appendix Table 1 shows the distribution of the locally determined norms for a single household per month, from 1995 through 2004.[5] The politically determined norm varies considerably across local governments. Since housing costs are excluded from the politically determined norms, the observed variation in welfare benefits can hardly be attributed to differences in living costs. Nor can the variation in welfare benefits be explained by differences across other particular dimensions, such as differences between rural and urban local governments.[6] The average welfare benefit norm to a single household was NOK 4203 (USD 700) per month in 2004.

No national standard concerning how much welfare recipients should be granted in welfare benefits existed until 2001. In February 2001 the central government announced a national instructive welfare benefit norm, which can be understood as a response to the differences observed among local governments prior to 2001. The rationale for the instructive norm was to "contribute to a more homogenous practice across local governments and to provide more similar support for equal recipients" (Circular I-13/2001 from the central government, my translation). The coefficient of variation reported in Appendix Table 1 has decreased from around 0.15 prior to the announcement to around 0.10 thereafter. It is evident that the instructive norms have succeeded in making the locally determined norms more homogenous.

2.2. Migration Rates

Data on received social assistance are available for the entire adult Norwegian population. To provide a clean test of the welfare migration hypothesis I limit the data set to men aged 16 to 66, without dependent children living in the same household. In each year this corresponds to approximately 810,000 people. It follows that about one sixth of the total Norwegian population is included in the data set (the total Norwegian population is approximately 4.5 million). A welfare recipient is defined as a person receiving welfare benefits within a given year. Appendix Table 2 shows the descriptive statistics on welfare recipient status and migration rates. In the econometric analysis to be conducted I take a bird's-eye perspective

[5] A total of 435 Norwegian local governments existed between 1995 and 2004. Due to a few missing variables and local government mergers I analyze a balanced panel of 430 local governments.
[6] Fiva and Rattsø (2006) find no statistically significant association between welfare benefits and population size and settlement pattern, controlling for other factors.

and evaluate overall migration flows to and from each local government. The key variable is then the net inflow of welfare recipients to each local government. The migration rates are measured as the proportion of people moving from one local government to another from January 1st in year t–1 to January 1st in year t.

The proportion of welfare recipients in the sample varies from 6.9% to 8.3% between 1996 and 2004. It follows that single men between 16 and 66 without dependent children are overrepresented as welfare recipients, since only 3% in the general population received welfare benefits during a given year. Since the welfare recipient population is quite heterogeneous it may be useful to distinguish between short- and long-term welfare recipients. Recipients that are in the welfare system for longer periods have stronger incentives to respond to changes in welfare generosity than the general population of welfare recipients. It is not clear where the line between 'short-term recipient' and 'long-term recipient' should be drawn. I suggest that people that received welfare benefits for at least four months within a given year be classified as long-term recipients. Although social assistance is intended to be granted in emergency situations and not as long-term support, the data indicate that several recipients have long periods of welfare dependence.[7] Figure 1 shows the distribution of welfare recipients according to the number of months they received welfare benefits within a given year. The figures are based on averages from 1996 to 2004, but the distributions for each year are nearly identical. Around 20% of the welfare recipients received welfare benefits for only one month; another 22% received welfare benefits for two or three months. This yields on average 42% short-term recipients and 58% long-term recipients according to my definition. Note that a recipient may have several welfare spells within a year and I do not distinguish between welfare recipients with several shorter welfare periods (of say one month each) and those with one longer welfare period.

Figure 1 about here.

Household mobility is generally considered to be higher in the US than within European countries. However, the proportion of people moving across local government lines in Norway is much higher than the corresponding proportion of people moving across US state

[7] Note also that around two out of three welfare recipients that received welfare benefits in year t also received welfare benefits in year t–1. Around half the welfare recipients that received welfare benefits in year t also received welfare benefits in year t–1 and year t+1.

lines. This follows from the fact that the average local government in Norway is much smaller in area than is the average US state. The average local government jurisdiction in Norway is approximately 700 km^2, whereas the continental US states range from around 4,000 km^2 (Rhode Island) to almost 700,000 km^2 (Texas).

Appendix Table 2 shows that around 13% of the welfare recipient population moved across local government lines from one year to the next compared to around 6–7% of the control group of nonrecipients.[8] Labor economists have generally explained the greater mobility of the poor as a function of the relatively low opportunity costs of moving for those with low incomes (Peterson and Rom, 1990). Levine and Zimmerman, who also utilized US data to study the welfare migration hypothesis, distinguished between poor single mothers and four different control groups (poor single women without children, poor single men, poor married women, and poor married men). They find that "roughly 5–7.5% of the control group members are observed moving across state lines between one year and the next, compared to just under 4% of the treatment group members" (Levine and Zimmerman (1999, p. 401)).[9] It follows that Norwegian single men without children receiving welfare are around three times as likely to move across jurisdiction lines as poor women with dependent children in the US. The treatment group members (never-married high school dropouts with children) in the McKinnish (2006) study are even less mobile: only 5–6% of them moved across state lines during a *five*-year period.

3. Empirical Strategy

If one is interested in the causal effect of changes in welfare policy on residential choices of welfare recipients, two key methodological issues must be addressed. First, unobserved factors that are correlated with changes in welfare policy may generate a spurious association between welfare policy and residential choices. Second, since policy makers are likely to take into account the migration responses of welfare recipients when deciding on welfare policy, cross-sectional variation in (changes in) welfare benefits is endogenous to the migration responses. While the first problem is properly addressed in the more recent studies of welfare

[8] A person is a welfare recipient if he received welfare benefits in year t–1, independent of whether he received welfare benefits in year t.
[9] Levine and Zimmerman (1999) found no evidence in favor of the welfare migration hypothesis.

migration, the second problem is typically ignored. In this section I discuss how both problems are addressed in the current study.

3.1. The Difference-in-Differences Estimator

The simplest test of the welfare migration hypothesis imaginable would be to investigate whether there is a positive correlation between changes in welfare generosity and net inflow of recipients from one year to the next. However, since people move for any number of pecuniary or nonpecuniary reasons, any sensible model of welfare migration cannot rely on changes in welfare benefits as the sole determinant of migration. If for example regional economic shocks altered both migration patterns and welfare generosity, this would confound the estimates. In order to take account of such problems one can use a group of similar people as a control group. A valid control group allows me to take into account factors unrelated to changes in welfare benefits. Technically this difference-in-differences approach facilitates this by adjusting changes in migration flows of welfare recipients (the treatment group) by changes in migration flows of nonrecipients (the control group). The central idea is that changes in welfare generosity will affect residential location of welfare recipients while leaving other people unaffected. In the econometric analysis I divide the sample into two groups, welfare recipients (the treatment group) and nonrecipients (the control group).[10] I condition on welfare receipt in year t–1 to reduce the possibility that endogenous welfare participation (correlation of welfare participation and welfare benefits) creates a spurious relationship between welfare policy and residential location.[11] I have also estimated the model, conditioning on welfare recipient status in year t, and the results are similar. This is comforting and suggests that endogenous welfare participation is not confounding the estimates.

[10] I also check how excluding short-term welfare recipients from the treatment group affects the estimates. The left-hand side variable in Eq. (1) below is then replaced with: $\left(\frac{\Delta\text{net\_inflow\_long\_recipients-}\Delta\text{net\_inflow\_control}}{\text{Population in 10 000s}}\right)$.

[11] If some people do not receive welfare payments in low-benefit states but would if they were in a high-benefit state, conditioning on welfare receipt in year t is likely to exaggerate the flow of welfare recipients from low- to high-benefit jurisdictions. Conditioning on welfare receipt in period t–1 would reduce the problem, but bias could still exist and would most likely go against finding evidence of welfare migration (Meyer, 2000). Conditioning on welfare receipt in period t–1 is also likely to exhibit a downward bias if a substantial number of poor people who are not on welfare in period t–1 (and are consequently assigned to the control group) migrate to other local governments to receive welfare benefits.

The main regression to be estimated is given by:

$$\left(\frac{\Delta\text{net\_inflow\_recipients-}\Delta\text{net\_inflow\_control}}{\text{Population in 10 000s}}\right)_{it} = \delta_1 + \delta_2 \Delta\text{Benefits}_{\text{it-1}} + \delta_3 \Delta\text{Unemployment}_{\text{it-1}} + u_{it}, \quad (1)$$

where

$$\Delta\text{net\_inflow\_recipients}_{it} = (\text{inflows of recipients}_{it} - \text{outflows of recipients}_{it}) - (\text{inflows of recipients}_{it-1} - \text{outflows of recipients}_{it-1}),$$

and

$$\Delta\text{net\_inflow\_control}_{it} = (\text{inflows of nonrecipients}_{it} - \text{outflows of nonrecipients}_{it}) - (\text{inflows of nonrecipients}_{it-1} - \text{outflows of nonrecipients}_{it-1}).$$

ΔBenefits$_{it-1}$ is the change in the politically determined norm granted to a single person per month in NOK 1000 from year t–2 to year t–1.[12] ΔBenefits is lagged one period because the change in benefits from year t–1 to year t cannot (technically) have an impact on the migration flows observed from t–1 to t, since migration rates are measured as net inflows from January 1st in year t–1 to January 1st in year t. The welfare migration hypothesis suggests that $\delta_2 > 0$.

As discussed above, the central idea in the difference-in-differences estimator is that the control group and the treatment group face many of the same migration incentives. However, to capture that economic conditions do not necessarily influence treatment and comparison groups in the same way, I include ***Δunemployment*** as a control variable. Unemployment is defined as the share of the male population that is unemployed (yearly average). δ_3 captures the differential effect of changes in unemployment rates on the treatment and control population. Utilizing US data, Bailey (2005) finds that the welfare population is less repelled by high unemployment, suggesting that $\delta_3 > 0$.

[12] I have also experimented with utilizing the percentage change in welfare benefits as an independent variable. The results are then similar, but in most specifications the fit is worse than when I use absolute changes.

3.2. Handling the Policy Endogeneity

If welfare-induced migration is a concern for policy makers, then ΔBenefits is endogenous to the left-hand side variable in Eq. (1). If this is the case, then estimating Eq. (1) with Ordinary Least Squares (OLS) would give rise to biased and inconsistent estimates. It is reasonable to argue that if the welfare population is increasing, policy makers will be inclined to reduce benefit levels. Utilizing a natural experiment (exogenous placement of refugees across Swedish municipalities) Dahlberg and Edmark (2004) find that policy makers in fact respond to increases in the welfare population by reducing welfare benefits. Gelbach's (2004) simulation results with US data also suggest that welfare migration depresses optimal state benefit levels. It follows that policy endogeneity is likely to result in a negative bias in δ_2 when estimating Eq. (1) with standard OLS. This problem is not properly addressed in the existing literature. While most studies have simply ignored policy endogeneity, Peterson and Rom (1989, 1990) and Berry et al. (2003) acknowledged the problem and addressed it by simultaneously estimating the mutual effects of welfare benefits and poverty rates, but the exclusion restrictions that they imposed to obtain identification are questionable.[13]

Without the ability to experimentally vary the relevant variable (welfare generosity) this paper follows the recommendation of Meyer and seeks "variation that is driven by factors that are clearly identified and understood" (1995, p. 153). I suggest that the introduction of national guidelines in Norway, discussed in Section 3.2, can act as a natural experiment that allows me to obtain exogenous variation in $\mathbf{\Delta Benefits_i}$. This approach facilitates a credible test of the welfare migration hypothesis, and potential bias in work that neglects policy endogeneity can be investigated.[14]

The policy reform can be thought of as generating instruments that can be used to identify causal effects. To take advantage of the exogenous variation that the policy reform generates, a two-stage least squares (2SLS) approach is warranted. Since the policy reform was implemented at one point in time, this identification strategy reduces the data set from a panel data set of eight years of observations to a simple cross-section for 2002. The underlying assumption for the applied identification strategy is that the national guidelines launched in

[13] E.g., Berry et al. (2003) exclude the private income level from the welfare benefit equation. This is problematic if redistribution to the poor is driven by altruism (which suggests a positive association between income level and welfare benefits).
[14] Meyer (1995) provides an insightful discussion of the issues surrounding natural experiments.

February 2001 had a direct impact on local government priorities. This is also what the data shows. In a survey conducted in August 2001, 104 out of 336 local governments[15] claimed that they had altered the welfare benefit levels after the national guidelines were announced. Of the local governments, 78 (19) claimed that they had changed their welfare benefits exclusively (partially) due to the announcement. In the current data set, 119 out of the 430 local governments chose to implement the national guidelines in 2001.

To capture the impact of the national guidelines I divide the local governments into five groups according to their welfare benefit levels in 2000 (the year prior to the policy reform). The division is based on how far the local governments were from the central guidelines to be launched the following year:

- Group 1: More than NOK 500 below the guidelines (11% of all local governments).
- Group 2: Below the guidelines, but by less than NOK 500 (27% of all local governments).
- Group 3: Above the guidelines, but by less than NOK 500 (31% of all local governments).
- Group 4: More than NOK 500 above the guidelines, but less than NOK 1000 (18% of all local governments).
- Group 5: More than NOK 1000 above the guidelines (13% of all local governments).

I expect the local governments that had welfare benefits below the national guidelines (NOK 3880) in 2000 to be more inclined to increase their welfare benefits relative to local governments that had welfare benefits above the national guidelines, and I expect this effect to be dependent on the distance to the central guidelines. To capture this I introduce 10 instrumental variables: five group dummies for each of the groups above and five interaction terms between the group dummies and the distance to the central guidelines. It follows that the first-stage regression in the 2SLS consists of regressing $\Delta \text{Benefits}_{i2001}$ on these 10 instrumental variables and $\Delta Unemployment_{i2001}$. The validity of this identification strategy rests on the assumption that local governments' welfare benefit levels in 2000 had no impact on the change in net inflows of welfare recipients (relative to the control group) in the following year, except through the impact on the change in welfare benefits.

[15] A total of 98 local governments did not respond.

4. Results

Looking into the Norwegian data on welfare policy and residential choices I start by providing a descriptive analysis of how the national guidelines affected overall migration rates. I then move on to the direct test of the welfare migration hypothesis, drawing on the identification strategy laid out in Section 3, before I discuss whether the estimated welfare migration effects are likely to be an important concern for policy makers.

4.1. Descriptive Analysis

The national guidelines launched in 2001 had two basic effects on local government priorities. First, the guidelines made the locally determined norms more homogenous. The coefficient of variation decreased from approximately 0.15 in the period prior to the guidelines to around 0.1 in the period after the guidelines (see Appendix Table 1). Second, the introduction of the guidelines in 2001 was associated with a drop in the raw correlation of welfare benefits between two consecutive years. Looking for evidence in favor of the welfare migration hypothesis I start out by evaluating whether the centrally implemented reform is associated with any changes in overall migration rates. If the welfare migration hypothesis is correct, then the introduction of the guidelines would have an impact on migration patterns of welfare-prone households for two reasons. In the short run the average incentives to move should have increased because several local governments radically altered their welfare benefit norms, and in the longer run incentives to move should be reduced due to more homogenous welfare benefits. Nonrecipients should be unaffected by the central government guidelines. Interestingly, as Figure 2 shows, the proportion of welfare recipients that moved across local government borders peaked in 2001–2002. The same finding holds when controlling for the migration rates of nonrecipients, but to a lesser extent. If welfare migrations typically are short distance moves, which McKinnish (2006) finds to be the case in the US, one would expect that migration rates across local government lines *within counties* to be particularly sensitive to the centrally implemented policy reform. Figure 3, which emphasizes within-county migration flows, exhibits the same pattern as Figure 2.

Figure 2 and Figure 3 about here.

Since welfare benefits became more homogenous after the introduction of the central guidelines, one would expect welfare migration to decline after the initial 'shock' taking place in 2001–2002. In 2002–2003 this argument is indeed supported by the data illustrated in Figure 2 and 3. However, somewhat puzzlingly, the migration rate increases in 2003–2004.

To further investigate whether welfare recipients actually moved more following the implementation of the national instructive norms I evaluate within-county mobility in Norway's 18 counties. Equation (2) shows the simple regression to be estimated:

$$(\text{Mobility\_Recipients}_{it} - \text{Mobility\_NonRecipients}_{it}) = f_i + \tau_t + \beta unemployment_{it-2} + \varepsilon_{it}, \quad (2)$$

where the dependent variable is the difference in within-county migration rates of welfare recipients and non-recipients, in county i at time t. On the right-hand side I include time specific fixed effects τ_t and county specific fixed effects, f_i. Since regional economic shocks may affect welfare recipients and nonrecipients differently, I include the lagged unemployment rate as an explanatory variable.

The results are presented in Table 1. The coefficient of interest is related to the 2002 dummy, which, all else equal, is expected to be positive according to the welfare migration hypothesis. In specification (1) I fail to find any statistically significant effect of any of the year dummies, including the dummy for 2002. As a further test, I impose the restriction that the impacts of all other dummies except one are set to be zero. This is reported in specifications (2) to (9). None of the dummies for the period prior to the policy reform turns out statistically significant, while the dummies for 2002, 2003, and 2004 come out statistically significant.

Table 1 about here.

As discussed above, two effects of the policy reform on overall migration rates of welfare recipients are to be expected. There is a short-term effect (positive) and a long-term effect (negative). The cleanest test of the welfare migration hypothesis is therefore to evaluate only the 2002 dummy where only the former effect can be present. The data shows that in comparison to other years, the difference in migration rates between recipients and nonrecipients within counties were on average 0.3% higher in 2002. This effect holds when

studying either the entire period available (specification (7)) or only the period up to the reform (specification (10)). This is evidence supporting the welfare migration hypothesis.

4.2. The Direct Test of the Welfare Migration Hypothesis

As discussed above, it may be highly problematic to rely on simple cross-sectional variation in changes in welfare benefits to identify welfare migration effects. To identify welfare migration effects one needs variation in welfare policy that can reasonably be treated as exogenous. The empirical strategy followed here is to utilize cross-sectional variation in changes in welfare benefits generated by the introduction of national guidelines launched in 2001. To establish this variation I estimate a first-stage regression where changes in welfare benefit levels from 2000 to 2001 are regressed on variables indicating the distance from the central guidelines (to be launched in 2001) in 2000. The first-stage regression is reported in Table 2.

Table 2 about here.

The F-test for joint significance of the excluded instruments suggests that the instruments do not suffer from the problems related to weak instruments (with an F-value of 19.86). As expected, local governments with welfare benefits below the central guidelines for 2001 are predicted to have increased their welfare benefits from 2000 to 2001, and to a greater extent the further they were from the central guidelines. The local governments above the central guidelines were predicted to reduce their welfare benefits and to some extent they were more likely to do this the further they were from the central guidelines. However, the effect is not symmetric for local governments above and below the guidelines. Local governments above the central guidelines seem to have been less inclined to conform to the national guidelines than those below the central guidelines. The discrepancy is best illustrated graphically. In Figure 4 actual welfare benefit levels in 2000 are on the horizontal axis, while predicted values for the change in welfare benefits from 2000 to 2001 are on the vertical axis. For comparison, Figure 5 shows the actual changes in welfare benefits relative to welfare benefit levels in 2000. The linear curve that can be spotted in Figure 5 corresponds to the 119 local governments that conformed to the central guidelines.

Figure 4 and Figure 5 about here.

The main results are presented in Table 3. As a benchmark for evaluating the potential endogeneity problem I include results from an OLS regression on Eq. (1) based on panel data for the period prior to the introduction of the central guidelines (1997–2001). In this sample no welfare migration effect can be found (specification (12)). However, when constraining the sample to the cross section when the central guidelines were launched and replacing actual values for ΔBenefits with fitted values from the first-stage regression, I find solid welfare migration effects, statistically significant at the 5% level.[16] No impact of the lagged unemployment rate is found. [17, 18]

The welfare migration effect is not only statistically significant, but also economically important. The point estimate of 18.69 suggests that an increase in welfare benefit levels of NOK 1000 is associated with an inflow of approximately 19 welfare recipients from the subpopulation under study for a local government with 10,000 inhabitants (an average Norwegian local government). A local government with 10,000 inhabitants will have around 1700 men, without children, between 16–66 years of age and on average, around 7% of them will be welfare recipients. It follows that this subpopulation of welfare recipients will increase by around 16%.

In Appendix Table 3 I report OLS cross-section regressions for each year. The estimated welfare migration effects exhibit considerable variation from year to year. Interestingly, the cross-section regression for 2002 is the only regression with a statistically significant positive welfare migration effect at the 5% level (although the cross-section regression for 2000 comes close). One possible interpretation of this finding is that the bias in the OLS estimates due to policy endogeneity is smaller in the 2002 cross section because many local governments

[16] In preliminary work I have also experimented with a more parsimonious first-stage specification in which I used only two group dummies (above and below NOK 3880) and their interaction with the distance to the central guidelines. This specification provides a somewhat lower fit of the first-stage regression (R^2_{adj} of 0.271). With the more parsimonious first-stage, the estimated welfare migration effects in the second stage are lower (around 10) and the standard errors are larger. There is no longer any statistically significant effect of $\mathbf{\Delta Benefits_{it-1}}$ (with p-values of around 0.2).

[17] Note that since the lagged change in unemployment may be endogenous to the left-hand side and therefore problematic as a control variable, I have run all specifications without this variable and this basically does not alter the impact of $\mathbf{\Delta Benefits_{it-1}}$.

[18] Increasing welfare benefits have two effects on migration flows: attracting people from other local governments and retaining the welfare population that is already living in the local government area. Reductions in welfare benefits will work exactly oppositely. The repelling and attracting forces may not necessarily be symmetric and may also manifest over different time spans. I have investigated whether the repelling effect is stronger than the attracting effect (or vice versa) but I have not found such an asymmetric welfare migration effect in the data.

mechanically adjusted their welfare benefit levels in line with the national guidelines from 2000 to 2001.

Since welfare recipients that are more dependent on welfare benefits may respond more to differences in welfare benefits, I run another set of regressions in which I exclude short-term recipients from the sample. The treatment group only consists of welfare recipients that received welfare benefits in at least four months in year t–1. Table 4 reports the results, which are basically a reproduction of the results in Table 3. The welfare migration effect is solid and close to being statistically significant at the 10% level when the policy endogeneity is properly handled. There is some evidence that the welfare migration effect is larger for long-term recipients than for short-term recipients. Of the welfare recipients, 42% are short-term recipients, but comparing specification (15) to specification (13) the point estimate is reduced by considerably less than 42%.

Table 4 about here.

Tables 5 and 6 reproduce Tables 3 and 4, respectively, but consider only short distance moves. Short distance moves are defined as migrations across local government lines *within counties*. The point estimates are again positive and borderline statistically significant (p-values of 0.072 and 0.101). Even though long distance migrations constitute 60% of all migrations, excluding those migrations do not reduce the point estimate from specifications (13) and (15) by more than 25% and 9%, respectively. This suggests that most of the welfare migration effect is driven by welfare recipients migrating between jurisdictions that are close together. Clearly, the definition of short distance migrations applied here is quite crude. A more sophisticated specification, for example migrations defined as moves no longer than a given number of kilometers, is likely to provide a superior specification. Thus, these results seem to suggest that short distance migration flows generate most of the welfare migration effect.

4.3. Is Welfare Migration Likely to be a Concern for Policy Makers?

The results above show that changes in welfare benefits exert a nontrivial effect on residential choices of welfare recipients. However, one may question whether this migratory response is perceived by local policy makers and whether policy makers react by holding benefit levels

below what they otherwise would be. Gelbach (2004) and McKinnish (2006) argue that this is probably not the case. Although they find that differences in welfare generosity generate substantial changes in the migration rates of welfare-prone households, they argue that even sizeable differences in migration rates do not generate particularly large migration flows because welfare-prone individuals in the US are a relatively immobile group. They conclude that welfare migration is unlikely to be a large concern of policy makers. The current study evaluates welfare migration in another country with decentralized responsibility for welfare policy, Norway. Taking advantage of a natural experiment, a bias in estimates that ignores the policy endogeneity is found. Hence, the conclusions of the current analysis stand in contrast to that of Gelbach (2004) and McKinnish (2006). If welfare migration were of no concern to policy makers, the standard OLS estimates would not be biased.

To see why it is reasonable for policy makers to worry about welfare magnetism, consider the following stylized example based on the results presented above. An average local government consisting of 10,000 inhabitants and 3% welfare recipients considers increasing its welfare benefits from NOK 4000 to NOK 4500 for all types of welfare recipients. In the no-mobility case, the cost of such a policy would simply be the increase in welfare benefits times the number of recipients living in the jurisdiction (NOK500*300 = NOK150,000). However when welfare recipients respond to changes in welfare benefits by relocating, the cost of welfare generosity increases because the jurisdictions' welfare recipient population increases. According to the most general 2SLS specification (specification (13)), a NOK 500 increase would lead to a net inflow of approximately nine welfare recipients from the subpopulation under study the following year (0.5*18.69). This corresponds to a 7.5% increase in the welfare recipient population under study.[19] Assuming that other welfare recipients groups (single women, families, etc.) react in similar fashion to changes in welfare benefit levels, then the cost of increasing welfare benefits with NOK 500 become: NOK 500*300 current recipients + NOK 4500*22.5 new recipients = NOK 251,250 per month. The cost is 67% higher than if welfare recipients do not respond to changes in welfare benefits and is certainly likely to be a concern for policy makers. The welfare migration cost may be exaggerated if, for example, households with children respond less to changes in welfare benefits. However, assuming that the migration response of all other households except single men 16–66 years of age without dependent children is equal to zero still suggests that the cost

[19] An average local government will have approximately 1700 men aged 16–66 without children, where around 120 (7%) are welfare recipients.

of increasing welfare benefits from NOK 4000 to NOK 4500 is 27% higher than it would be in the absence of welfare migration. Although the confidence interval of the estimate driving this result admittedly is quite large, the results in this analysis suggest that welfare migration is likely to be a concern for policy makers. This is consistent with the strong strategic interaction in welfare policy found among Norwegian local governments by Fiva and Rattsø (2006).

5. Conclusion

With closer EU integration some economists and policy makers are worried that increased mobility of people, goods, and factors of production may release competitive forces leading to a roll back of social standards and welfare state arrangements. Countries have incentives to improve their relative position through successive undercutting of tax rates and welfare state arrangements, thereby attracting productive mobile production factors and deterring immigrants that impose a negative fiscal impact on the government budget. How important migration of welfare prone households is in Europe is not obvious, because cross-country mobility of households is fairly low and because EU rules have been designed to prevent this form of 'social mobility' by making free mobility contingent on employment (Andersen, 2003).

The current paper deals with the welfare migration hypothesis in a setting where household mobility is much higher than across European country lines and where there exist no rules to prevent this form of migration. Mobility across jurisdiction lines with responsibility for welfare policy in the country under study—Norway—is also considerably higher than in the US. Consequently, if welfare migration is important, it should be obvious in Norway. The current analysis exploits a natural experiment taking place in Norway to investigate the welfare migration hypothesis and finds supportive evidence. In particular, there seems to be a downward bias in regular OLS estimates that ignores the inherent policy endogeneity. The welfare migration responses are of a magnitude that suggests that local government policy makers are likely to worry about 'welfare magnetism' and fiscal competition in welfare policy is likely to prevail. As is well known from the theoretical literature, this may result in an equilibrium characterized by suboptimal levels of redistribution. Although this is not necessarily the case in Norway (due to the centralized financing of the local governments), this paper suggests that the main argument against decentralized responsibility for

redistribution is not merely a theoretical possibility. Rather this argument seems highly relevant in settings similar to the one analyzed by the current paper. The importance of welfare migration in settings where household mobility is lower than across local government borders in Norway, such as between European countries, is a topic that should be addressed in future research.

References

Andersen, Torben M. (2003): "International Integration and the Welfare State", in Torben M. Andersen and Per Molander (eds.), *Alternatives for Welfare Policy*, Cambridge University Press, Cambridge, UK, pp 23–48.

Bailey, Michael A. (2005): "Welfare and the Multifaceted Decision to Move", American Political Science Review 99, 125–135.

Berry, William D., Richard C. Fording, and Russell L. Hanson (2003): "Reassessing the 'Race to the Bottom' in State Welfare Policy", Journal of Politics 65, 327–349.

Brown, Charles and Wallace E. Oates (1987): "Assistance to the Poor in a Federal System", Journal of Public Economics 32, 307–330.

Brueckner, Jan K. (2000): "Welfare Reform and the Race to the Bottom: Theory and Evidence", Southern Economic Journal 66, 505–525.

Dahlberg, Matz and Karin Edmark (2004): "Is there a 'Race-to-the-Bottom' in the Setting of Welfare Benefit Levels? Evidence from a Policy Intervention". Working Paper 2004:19, Department of Economics, Uppsala University.

Fiva, Jon H. and Jørn Rattsø (2006): "Welfare Competition in Norway: Norms and Expenditures", European Journal of Political Economy 22, 202–222.

Gelbach, Jonah (2004): "Migration, the Lifecycle and State Benefits: How Low is the Bottom?" Journal of Political Economy 112, 1091–1130.

Ladd, Helen F. and Fred C. Doolittle (1982): "Which Level of Government Should Assist the Poor?", National Tax Journal 35, 323–336.

Levine, Phillip and David Zimmerman (1999): "An Empirical Analysis of the Welfare Debate Using the NLSY", Journal of Population Economics 12, 391–409.

McKinnish, Terra (2005): "Importing the Poor: Welfare Magnetism and Cross-Border Welfare Migration", Journal of Human Resources 40, 57–76.

McKinnish, Terra (2006): "Welfare-Induced Migration at State Borders: New Evidence from Micro-Data", Journal of Public Economics, forthcoming.

Meyer, Bruce D. (1995): "Natural and Quasi-experiments in Economics", Journal of Business and Economics Statistics 13, 151–161.

Meyer, Bruce D. (2000): "Do the Poor Move to Receive Higher Welfare Benefits?", unpublished paper, Department of Economics, Northwestern University.

Moffit, Robert (1992): "Incentive Effects of the U.S. Welfare System: A Review", Journal of Economic Literature 30, 1–61.

Musgrave, Richard (1959): *The Theory of Public Finance*, McGraw-Hill, New York.

Peterson, Paul E. and Mark C. Rom (1989): “American Federalism, Welfare Policy, and Residential Choices”, American Political Science Review 83, 711–728.

Peterson, Paul E. and Mark C. Rom (1990): *Welfare Magnets: A New Case for a National Welfare Standard*. The Brookings Institution, Washington.

Stigler, George J. (1957): “The Tenable Range of Functions of Local Government”, in US Congress Joint Economic Committee (ed.), *Federal Expenditure Policy for Economic Growth and Stability*, 213–219, Washington DC; also reprinted in Wallace E. Oates (ed.), 1998, *The Economics of Fiscal Federalism and Local Finance*, Cheltenham, Edward Elgar, pp 3–9.

Wildasin, David E. (1991): “Income Redistribution in a Common Labor Market”, American Economic Review 81, 757–774.

Figure 1
Duration of welfare receipt, 1996–2004 averages.

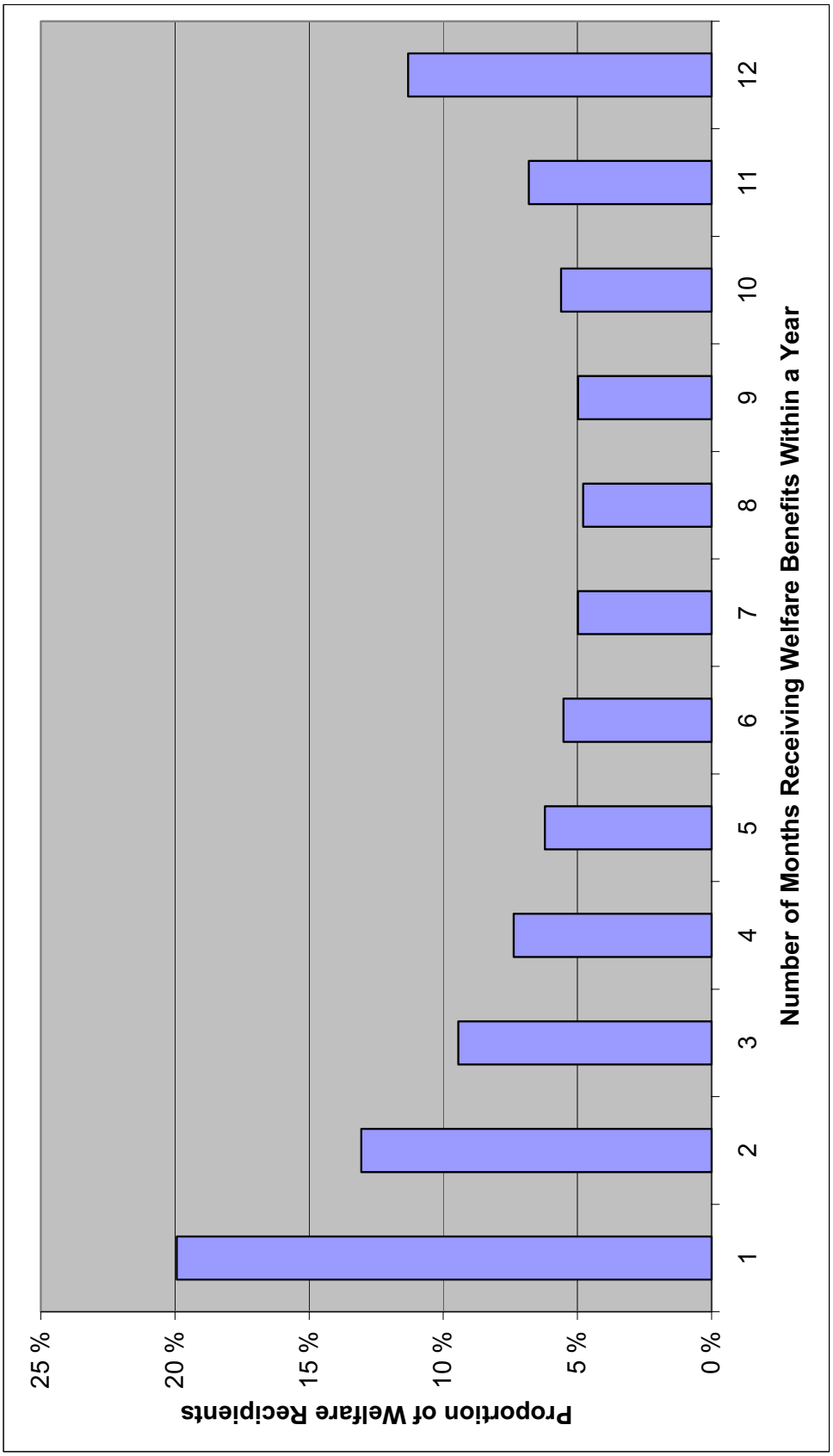


Figure 2
People moving across local government borders from one year to the next, according to welfare recipient status (short-term, long-term, nonrecipient).

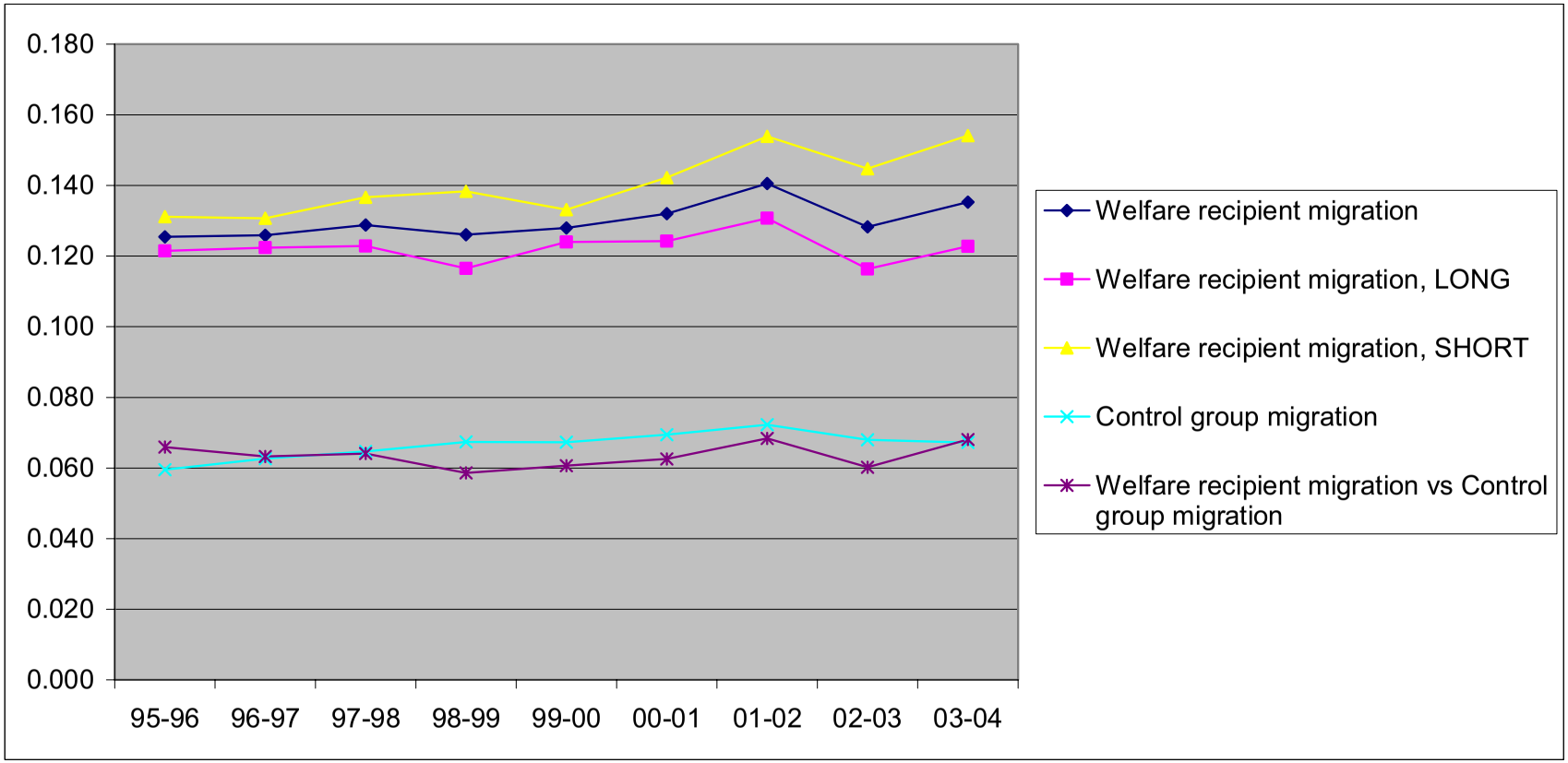


Figure 3
People moving across local government borders ***within counties*** from one year to the next, according to welfare recipient status (short-term, long-term, nonrecipient).

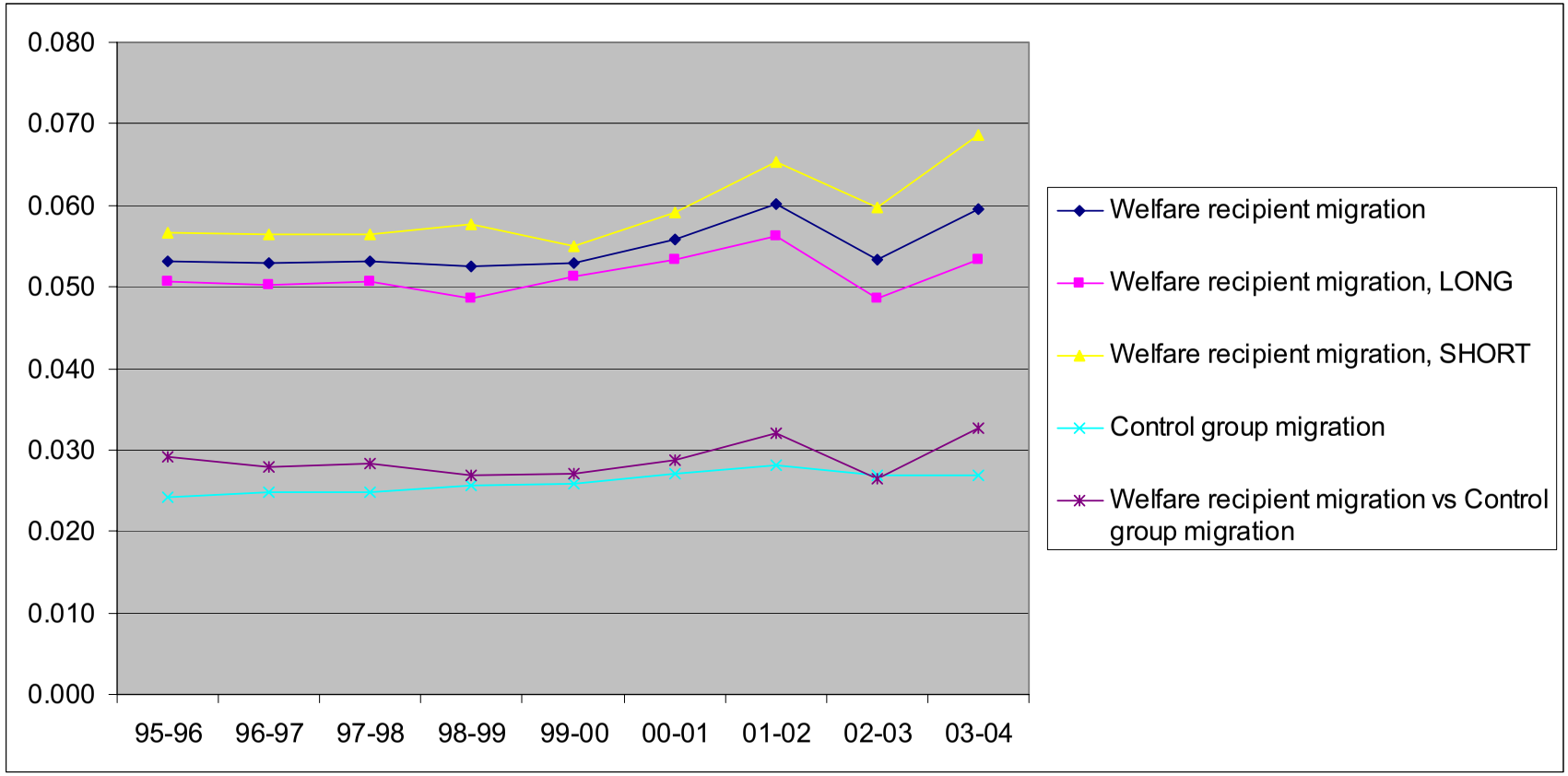


Figure 4
Welfare benefit levels in 2000 (horizontal axis) and *predicted changes* in welfare benefit levels from 2000 to 2001 from the first-stage regression (vertical axis). Welfare benefit levels are measured in 1000 NOK.

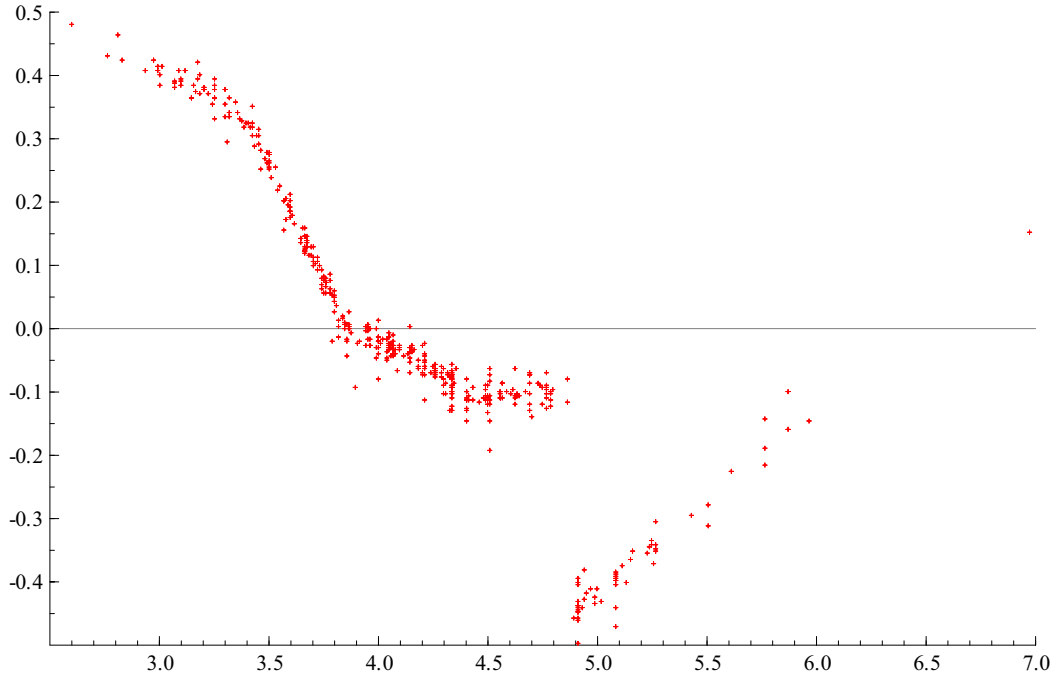


Figure 5
Welfare benefit levels in 2000 (horizontal axis) and *actual changes* in welfare benefit levels from 2000 to 2001 (vertical axis). Welfare benefit levels are measured in 1000 NOK.

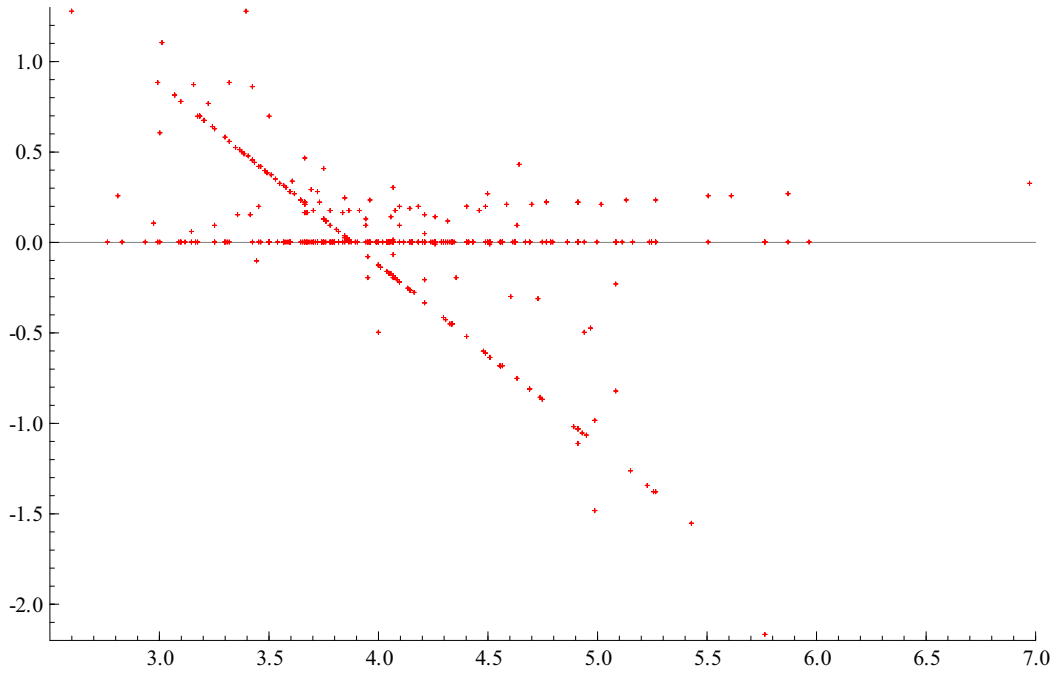


Table 1

The dependent variable is $(\text{Mobility\_Recipients}_{it} - \text{Mobility\_NonRecipients}_{it})$

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
D1997			–0.0011	0.023																
D1998	–0.0004	0.0023			0.0005	0.0018														
D1999	–0.0048	0.0036					–0.0025	0.0016												
D2000	–0.0053	0.0049							–0.0015	0.0018										
D2001	–0.0037	0.0043									–0.0002	0.0017								
D2002 (Year following policy reform)	–0.0005	0.0039											0.0032	0.0016					0.0034	0.0016
D2003	–0.0069	0.0042													–0.0041	0.0017				
D2004	0.0016	0.0035															0.0047	0.0016		
Unemployment (–2)	–0.308	0.341	0.119	0.178	0.043	0.137	0.052	0.124	–0.310	0.34	0.054	0.129	0.097	0.125	–0.01	0.125	0.063	0.121	0.065	0.121
R^2_{adj}	0.605		0.557		0.557		0.564		0.559		0.557		0.569		0.578		0.586		0.608	
Number of observations	144		144		144		144		144		144		144		144		144		108	
County fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Sample	1997–2004		1997–2004		1997–2004		1997–2004		1997–2004		1997–2004		1997–2004		1997–2004		1997–2004		1997–2002	

Table 2

First-stage regression: dependent variable is ΔBenefits (–1)

		(11)	
		Coeff.	St. error
Group1	(Benefits<3380)	0.27	0.20
Group2	(3380<Benefits<3880)	–0.01	0.05
Group3	(3880<Benefits<4380)	0.00	0.06
Group4	(4380<Benefits<4880)	–0.15	0.19
Group5	(Benefits>4880)	–0.73	0.15
Group1*distance		0.16	0.27
Group2*distance		0.71	0.21
Group3*distance		–0.18	0.21
Group4*distance		0.07	0.27
Group5*distance		0.29	0.11
ΔUnemployment (–1)		0.06	0.05
R^2_{adj}		0.324	
Number of observations		430	
Sample		2002	
Estimation method		OLS	

Table 3

Dependent variable is $\left(\frac{\Delta net\_inflow\_recipients - \Delta net\_inflow\_control}{Population\ in\ 10\ 000s}\right)$, all recipients are included.

	(12)		(13)	
	Coeff.	St. error	Coeff.	St. error
Δbenefits (–1)	–0.53	3.54	18.69	8.68
Δunemployment (–1)	2.73	3.54	2.91	7.99
R^2_{adj}	0.000		0.008	
Number of observations	2150		430	
Time fixed effects	Yes		Yes	
Sample	1997–2001		2002	
Treatment group	All recipients		All recipients	
Estimation method	OLS		2SLS	

Note: Standard errors are robust to unknown forms of heteroscedasticity.

Table 4

Dependent variable is $\left(\frac{\Delta net\_inflow\_long\_recipients - \Delta net\_inflow\_control}{Population\ in\ 10\ 000s}\right)$, only long-term recipients are included.

	(14)		(15)	
	Coeff.	St. error	Coeff.	St. error
Δbenefits (–1)	0.07	3.37	13.73	8.63
Δunemployment (–1)	5.82	3.62	3.77	7.65
R^2_{adj}	0.004		0.005	
Number of observations	2150		430	
Time fixed effects	Yes		No	
Sample	1997–2001		2002	
Treatment group	Long-term recipients		Long-term recipients	
Estimation method	OLS		2SLS	

Note: Standard errors are robust to unknown forms of heteroscedasticity.

Table 5

Dependent variable is $\left(\frac{\Delta\text{net\_inflow\_recipients-}\Delta\text{net\_inflow\_control}}{\text{Population in 10 000s}}\right)$, only within-county migration, all recipients are included.

	(16)		(17)	
	Coeff.	St. error	Coeff.	St. error
Δbenefits (–1)	0.56	2.17	14.02	7.79
Δunemployment (–1)	–1.72	2.12	0.61	5.86
R^2_{adj}	0.000		0.000	
Number of observations	2150		430	
Time fixed effects	Yes		No	
Sample	1997–2001		2002	
Treatment group	All recipients		All recipients	
Estimation method	OLS		2SLS	

Note: Standard errors are robust to unknown forms of heteroscedasticity.

Table 6

Dependent variable is $\left(\frac{\Delta\text{net\_inflow\_long\_recipients-}\Delta\text{net\_inflow\_control}}{\text{Population in 10 000s}}\right)$, only within-county migration, only long-term recipients are included.

	(18)		(19)	
	Coeff.	St. error	Coeff.	St. error
Δbenefits (–1)	0.59	2.17	12.44	7.59
Δunemployment (–1)	–0.39	2.29	1.02	5.49
R^2_{adj}	0.004		0.000	
Number of observations	2150		430	
Time fixed effects	Yes		No	
Sample	1997–2001		2002	
Treatment group	Long-term recipients		Long-term recipients	
Estimation method	OLS		2SLS	

Note: Standard errors are robust to unknown forms of heteroscedasticity.

Appendix Table 1

Descriptive statistics on welfare benefit levels across local governments. Welfare benefits are measured as the politically determined norm for a single household without children, per month in nominal NOK (unless otherwise noted).

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Mean	3620	3710	3808	3969	4044	4119	4119	4175	4163	4203
Mean in constant 1995 NOK	3620	3667	3668	3739	3724	3678	3570	3572	3477	3494
Standard deviation	524	525	556	605	613	624	543	466	434	386
Coefficient of variation	0.14	0.14	0.15	0.15	0.15	0.15	0.13	0.11	0.10	0.09
Minimum	1900	1900	2102	2258	2484	2600	2760	2760	3000	3000
Median	3660	3697	3800	3935	4005	4068	3950	4000	4000	4140
Maximum	5281	5520	5722	6441	5964	6969	7291	6140	5948	6120
Proportion of local governments **increasing** the nominal politically determined norm from year t–1 to year t with more than NOK 600		12	9	52	22	25	21	20	5	5
Proportion of local governments **decreasing** the nominal politically determined norm from year t–1 to year t with more than NOK 600		5	2	4	9	10	30	10	15	11
Correlation between politically determined norm in year t and year t–1		0.890	0.927	0.819	0.845	0.842	0.801	0.798	0.846	0.879
National guidelines, in NOK							3880	4000	4000	4140
Above						265*	220	175	165	127
At						0*	119	149	175	175
Below						165*	91	106	90	128
Observations	430	430	430	430	430	430	430	430	430	430

* relative to the norm in 2001.

Appendix Table 2

Descriptive statistics on welfare recipient status and migration rates.

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total number of individuals	810926	809279	808099	809120	809824	809945	807811	805871	806224
Total number of welfare recipients	67473	63447	58310	56024	56682	56705	56568	58664	57644
Total number of long-term recipients	39533	36698	33136	31506	31885	32105	32465	34161	34663
Total number of short-term recipients	27940	26749	25174	24518	24797	24600	24103	24503	22981
Total number of nonrecipients	743453	745832	749789	753096	753142	753240	751243	747207	748580
Proportion of welfare recipients	0.083	0.078	0.072	0.069	0.070	0.070	0.070	0.073	0.071
Proportion of long-term welfare recipients of all recipients	0.586	0.578	0.568	0.562	0.563	0.566	0.574	0.582	0.601
Moving across local government lines	**95–96**	**96–97**	**97–98**	**98–99**	**99–00**	**00–01**	**01–02**	**02–03**	**03-04**
Total number of people moving	52737	54724	56043	57828	57948	59778	62216	58351	58113
Total number of welfare recipients moving	8466	7987	7512	7061	7255	7486	7952	7523	7797
Total number of long-term welfare recipients moving	4802	4491	4071	3670	3954	3988	4243	3976	4255
Total number of short-term welfare recipients moving	3664	3496	3441	3391	3301	3498	3709	3547	3542
Total number of nonrecipients moving	44271	46737	48531	50767	50693	52292	54264	50828	50316
Migration rates	**95–96**	**96–97**	**97–98**	**98–99**	**99–00**	**00–01**	**01–02**	**02–03**	**03–04**
Welfare recipient migration rates	0.125	0.126	0.129	0.126	0.128	0.132	0.141	0.128	0.135
Long-term welfare recipients migration rates	0.121	0.122	0.123	0.116	0.124	0.124	0.131	0.116	0.123
Short-term welfare recipients migration rates	0.131	0.131	0.137	0.138	0.133	0.142	0.154	0.145	0.154
Nonrecipient migration rates (control group)	0.060	0.063	0.065	0.067	0.067	0.069	0.072	0.068	0.067
Welfare recipient migration vs. Control group migration	0.066	0.063	0.064	0.059	0.061	0.063	0.068	0.060	0.068
Moving across local government lines within counties	**95–96**	**96–97**	**97–98**	**98–99**	**99–00**	**00–01**	**01–02**	**02–03**	**03–04**
Total number of people moving	21493	21898	21716	22303	22473	23612	24533	23175	23501
Total number of welfare recipients moving	3585	3352	3099	2945	2996	3167	3400	3125	3427
Total number of long-term welfare recipients moving	2004	1840	1679	1529	1634	1711	1828	1663	1849
Total number of short-term welfare recipients moving	1581	1512	1420	1416	1362	1456	1572	1462	1578
Total number of nonrecipients moving	17908	18546	18617	19358	19477	20445	21133	20050	20074
Migration rates within counties	**95–96**	**96–97**	**97–98**	**98–99**	**99–00**	**00–01**	**01–02**	**02–03**	**03–04**
Welfare recipient migration rates	0.053	0.053	0.053	0.053	0.053	0.056	0.060	0.053	0.059
Long-term welfare recipients migration rates	0.051	0.050	0.051	0.049	0.051	0.053	0.056	0.049	0.053
Short-term welfare recipients migration rates	0.057	0.057	0.056	0.058	0.055	0.059	0.065	0.060	0.069
Nonrecipient migration rates (control group)	0.024	0.025	0.025	0.026	0.026	0.027	0.028	0.027	0.027
Welfare recipient migration vs. Control group migration	0.029	0.028	0.028	0.027	0.027	0.029	0.032	0.026	0.033

Appendix Table 3

Dependent variable is $\left(\frac{\Delta\text{net\_inflow\_recipients}-\Delta\text{net\_inflow\_control}}{\text{Population in 10 000s}}\right)$, all recipients are included.

	(1a)		(2a)		(3a)		(4a)		(5a)		(6a)		(7a)		(8a)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
Δbenefits (–1)	1.96	8.12	7.25	8.25	–20.39	7.88	16.75	8.74	–1.64	4.48	11.77	4.68	–2.16	5.07	13.56	9.35
Δunemployment (–1)	8.59	4.63	0.09	7.81	10.99	8.82	–14.19	12.47	5.86	5.10	3.41	8.12	10.04	4.57	3.69	4.04
R^2_{adj}	0.009		0.003		0.028		0.023		0.003		0.008		0.006		0.006	
Number of observations	430		430		430		430		430		430		430		430	
Time fixed effects	No		No		No		No		No		No		No		No	
Sample	1997		1998		1999		2000		2001		2002		2003		2004	
Treatment group	All recipients		All recipients		All recipients		All recipients		All recipients		All recipients		All recipients		All recipients	
Estimation method	OLS		OLS		OLS		OLS		OLS		OLS		OLS		OLS	

Note: Standard errors are robust to unknown form of heteroscedasticity.

Chapter 4

Local Choice of Property Taxation: Evidence from Norway

Local Choice of Property Taxation: Evidence from Norway*

Jon H. Fiva and Jørn Rattsø

Abstract

Decentralization of government with property tax financing is the standard recipe for public sector reform. Property taxation involves an incentive mechanism that is assumed to stimulate efficiency. We study the local choice of having property taxation in a setting where local governments can choose not to have property tax. The empirical analysis addresses whether political control problems motivate the choice of having property taxation. The local choice is investigated in an econometric model allowing for yardstick competition. The results indicate that political fragmentation motivates property taxation to control common pool problems. Yardstick competition generates a distinct geographic pattern in local property taxation. The main methodological challenge handled concerns spatial interaction with discrete choice.

JEL classification: C11, C21, D78, H71;
Keywords: property taxation, yardstick competition, political fragmentation, Bayesian analysis, spatial autoregressive model.

* We appreciate financing from the Norwegian Research Council and comments on an earlier version from participants at the Research Workshop on Political Economy at Harvard University and at the 61st congress of the International Institute of Public Finance, in particular from Mark Schelker. We also thank Garth Holloway, Donald Lacombe and Tim Thomas for helpful discussions concerning the Bayesian analysis.

1. Introduction

Control problems and rigidities in public sector service provision have motivated search for incentive mechanisms to stimulate cost efficiency. Decentralization to local governments with property taxation is the standard World Bank - IMF advice to developing and transition economies (re)forming the public sector. De Mello (2004) summarizes the arguments and the cross-country evidence. Property taxation links public sector performance to government revenue via property values, and this feed back loop may serve as a discipline device. Property taxation also may raise popular control of politicians because it represents a direct and visible influence on the private economy of the inhabitants. Since most countries have property taxation for all of decentralized government, there is no control group to identify the incentive effect of the tax. We offer an alternative and indirect empirical evaluation of property taxation.

Local governments in Norway can choose to have property taxation or not. Our approach is to investigate whether the local choice is affected by political control problems, notably party fragmentation. Previous studies have shown that party fragmentation leads to excessive and inefficient government. Local governments with fragmentation can possibly reduce this problem by having property taxation. The results confirm that the use of property taxation reflects political fragmentation and our interpretation is that property tax incentives matter.

Brennan and Buchanan (1978, 1980) introduced the design of tax systems as incentive mechanism. Their main approach is the control of' 'Leviathan' government, but they also discuss incentives of public service provision. In particular they show how governments are stimulated to supply public services when the tax base is complementary to the provision of the public services. The more recent literature on tax incentives have concentrated on property taxation. Oates (2001) summarizes the arguments that property taxes facilitate efficient local fiscal decision-making. When property taxation can help control government officials, property taxation will be more desired the larger the imperfections of the political decision making process. We expect that voters will be more eager to have property taxation when the political system is inefficient. In the tradition of Roubini and Sachs (1989), the main source of fiscal inefficiencies is political fragmentation. Perotti and Kontoupolos (2002) offer an updated evaluation of fragmented government. The stylized fact is that political fragmentation leads to excessive spending and fiscal imbalance. This literature leaves an open question what

voters do to overcome the consequences of political fragmentation. Redesign of political institutions is a possibility. But since this is cumbersome and hard to do, it seems natural to look for alternative mechanisms. We relate the decision to have property tax to the degree of political fragmentation in the local government.

Given the 'Leviathan' government challenge and the favorable characteristics of the property tax, it is of interest to analyze how local governments evaluate property taxation. Our approach is inspired by the literature on positive analysis of tax structure. Inman (1989) introduce a political economy model of the local decision to tax. Hettich and Winer (1999) more broadly advocate the understanding of tax structure as a political equilibrium. We include their emphasis on political characteristics, since this is important for the functioning of property taxes as an incentive mechanism to control government. We extend their frameworks by embedding the analysis in a spatial interaction model.

The local choice of having property taxation is possibly influenced by the choices of neighboring municipalities and this interdependency must be taken into account in a complete positive model of local taxation. Wilson and Wildasin (2004) offer a recent overview of fiscal competition and with discussion of the empirical literature. We read the empirical studies as an overwhelming support of the existence of strategic interaction at the local government level, and that both tax base mobility and information asymmetries may be of importance. In our setting, since property taxation relates to immobile factors, yardstick competition is the most realistic form of fiscal competition. Empirical studies of relevance typically point to yardstick competition as the most likely source of strategic interaction among local governments. The analysis addresses the econometric challenges of spatial models with discrete dependent variables.

Section 2 presents the empirical context and the data. The empirical approach is discussed in section 3 and section 4 presents our econometric strategy. The discrete choice to have property taxation (probit analysis) is analyzed in section 5, while section 6 expands the analysis to look at the revenue generation (tobit analysis). Section 7 offers concluding remarks.

2. Local Property Taxation in Norway

Local governments in Norway can choose to have residential property taxation. The financing of the local governments is highly centralized, and more than 80% of the revenues are generated from central government grants and regulated income taxes. The grants are distributed as block grants and are based on objective criteria, partly as tax equalization and partly as spending equalization. The income tax revenue is shared between local, county and central governments with the maximum income tax rate at the local level set by the central government. All local governments apply the maximum income tax rate and their grants and income tax revenue consequently appear as given from above. Local governments have some discretion in setting fees for infrastructure services and welfare services, but also the fees are regulated and with the general rule that they can only cover costs. Borge (1995) and Borge and Rattsø (2005) analyze the fee setting, and Carlsen et al. (2005) investigate the role of mobility for the determination of fees for infrastructure services. The choice of having property tax is the key local decision to tax. Borge and Rattsø (2004) analyze determinants of the tax structure, the mix of revenues from property taxation and fees. We will have a closer look at the discrete choice of having property tax.

The property tax is defined by law (of June 6, 1975) and the decision to have the tax is fully in the hands of the local government. The law describes the property that can be taxed, the tax base assessment, and restrictions to the tax rate. Residential property taxation is restricted to urban areas, that is towns and areas under construction that will appear as towns. This definition of an urban area is not very clear, and there are many court cases where property owners have argued that the area under taxation is not urban.

Local governments in Norway are heterogeneous with respect to population size, with many small municipalities up valleys and along fjords. The median municipality has about 4.500 inhabitants, while the average is a population of 10.000. Since we study the choice of having property tax, we exclude local governments that cannot have property tax because they have no urban areas. We set the cut off point to 2.500 inhabitants and exclude local governments

with population below this. Given the 434 local governments in all in 2001, we apply data for 301 local governments, and 105 of them levy residential property taxation.[1]

All local governments have an assessment of house values related to the income tax. The assessment value is on average about 30% of the market value. The locals differ in their assessment, although most of them have assessed values in the area of 15-40% of market value. In addition to differences in the assessment practice, there are also variations in deductions (14 out of 108 local governments use different forms of deductions). The property tax rate is restricted to the interval 0.2% and 0.7% of the assessed housing value. 74 of the 108 local governments with property taxation apply the maximum rate, and the average tax-rate is 0.61%. In addition to the residential property tax about 120 other local governments have a commercial property tax. This is basically a tax on electric power stations and part of a system of distributing the resource rent of electricity based on waterfalls. The commercial property tax is excluded here.

Our main focus concerns the existence of residential property taxation, but in an extension we will look at the determination of property tax revenue. Based on survey data we calculate how much a standardized household will have to pay in property taxation in each local government levying residential property taxation. The standardized house is assumed to be 160 sq. meters with a market value of NOK 1 million (USD 160 000). The average effective tax for the standardized house is NOK 1820 (USD 290), varying from NOK 4312 to NOK 130. A majority of the local governments (57 out of 108) levy effective taxes between NOK 1001 and NOK 2000.

3. Empirical Modeling

We study a situation where local governments can choose to have property taxation or not. Our main approach is to study this as a discrete choice between two alternatives: with and without the tax. The dummy variable dptax is our dependent variable, and dptax = 1 when the local government has residential property taxation. In an extension we will look at determinants of property tax revenue (ptax).

[1] The cut off at 2.500 inhabitants seems to work well as a general criterion and only 3 local governments with property taxation are excluded (see Appendix Table 1). The capital Oslo is excluded and data for two local governments are missing.

In the conventional understanding of the role of taxation, the benefits of the increased public services financed by the new tax must be evaluated against the costs of raising the new revenue. Local governments choosing not to have property taxation are allowed higher private consumption and lower public consumption compared to those with property taxation. A standard fiscal demand model of the decision to levy property taxation emphasize two economic determinants, the private income level ($\overline{y}$) and the central government grants (G), both measured per capita. The private income level also works as a proxy for the property tax base here, since data about property valuation at the local level are not available. Consistent with the many studies of local public choice in the Scandinavian countries, we include the socialist share of the local council (SOC) as a measure of ideological orientation. Socialist oriented municipalities tend to have higher tax and spending levels.

The first extension of this standard demand understanding is fiscal competition whereby the choice of property taxation in one municipality depends on choices in other municipalities. We concentrate on yardstick competition implying that voters make use of information about the political choices in neighboring local governments. The decisions of the neighbors carry an information externality, they represent information to evaluate the performance of own government. It follows that voters condition their electoral choices on the relative fiscal performance of their own versus neighboring local governments. The understanding of the mechanism was first developed by Salmon (1987) and formalized by Besley and Case (1995). Econometric studies of fiscal competition tend to indicate that yardstick competition is the most relevant form (Allers and Elhorst, 2005, provide an overview).

We are aware of three different studies of strategic interaction in property tax decisions that try to separate yardstick competition from competition for a mobile tax base. Bordignon et al. (2003) find that business property tax interdependence in Italian cities is present only in those cities where mayors can run for reelection and are not backed by strong majorities. Solé-Ollé (2003) finds that property tax mimicking among Spanish municipalities is stronger in municipalities where the majority of the ruling parties is smaller and in election years. Finally, Allers and Elhorst (2005) study strategic interaction in residential property taxation in Dutch municipalities and find that interaction is weaker when the electoral margin is high.[2] The

[2] All of these analysis study property tax interaction in a continuous dependent variable setting.

Dutch setting is very similar to the Norwegian and is characterized by low mobility of the tax base and politically highly visible decisions.

Yardstick competition implies that the existence of property taxation in community i ($dptax_i$) depends on the existence of property taxation in all other N communities that are suitable for voters to use as yardsticks. In our empirical specification we relate the tax choice in municipality i to the tax choice in contiguous municipalities that are allowed to levy property taxation and also a series of municipal characteristics (including the traditional determinants outlined above).

The second extension of the fiscal demand model includes local political control problems that may motivate having property taxation as an incentive mechanism. The general Brennan-Buchanan argument is developed in the context of property taxation by Glaeser (1996). It is based on the complementarity between local service provision and tax base via housing values. Gordon and Wilson (2000) and Wilson and Gordon (2003) analyze similar relationships between voters and officials emphasizing government waste (or slack) and in the context of tax competition. Property taxation may reduce waste since the officials will take into account the feedback via property values. Hoxby (1999) provides a theoretical framework to analyze costs and efforts in schools and introduces property taxation as a disciplining device. Property taxation links school quality to school financing and helps control costs and efforts in schools. More broadly Fischel (2001) introduces the concept of 'homevoters', homeowners whose voting is guided by their concern for home values. Since homeowners are locked into the locality, they focus on local government behavior and consequently the housing market disciplines local decisions. Brunner and Sonstelie (2003) supply empirical evidence that homeowners vote to protect their property values (voucher issue in California). The incentive effects of property taxation to hold down costs are shown by Borge and Rattsø (2006) comparing local governments with and without property tax in Norway. Fiva and Rønning (2006) find favorable incentive effects of property taxation on school district performance in Norway.

In the empirical part we concentrate on political fragmentation. An extensive literature on fiscal policy outcomes based on Roubini and Sachs (1989) has shown the importance of political fragmentation for fiscal imbalance and the level of spending and taxation. Perotti and Kontopoulos (2002) offer a recent documentation. In the Norwegian local government setting,

Kalseth and Rattsø (1998) have shown how fragmentation is associated with higher administrative costs and Borge and Rattsø (2005) show that fragmentation increases the fee level. We hypothesize that local governments with more fragmented political system is more likely to have property taxation.

Political fragmentation is measured by a Herfindahl-index of party fragmentation of the local council. When SH_p is the share of representatives from party p, then the Herfindahl index for party fragmentation (HERF) is given by:

$$\text{HERF} = \sum_{p=1}^{P} SH_p^2 . \qquad (1)$$

The Herfindahl-index is generally given by 1/P, when the representatives are equally divided among P parties. The index has maximum value of 1 when there is only one party in the council. The Herfindahl index ranges from 0.14 to 0.60 in our sample, with a sample mean of 0.24.

The data are documented in Appendix Table 2. As control variables in all regressions we include population size, a measure of the income distribution (ratio of median to mean income, $\frac{y_m}{\bar{y}}$), the age distribution of the population (CHILDREN (below 5 years), YOUNG (between 6 and 15 years) and ELDERLY (above 66 years)), and share of the population living in rural areas.

4. Spatial Econometric Issues

Different approaches for undertaking estimation and inference in linear regression models with spatial effects are well developed. However, spatial models with discrete dependent variables have received little attention in the literature and empirical implementation of such models is an area of active research. Estimation of spatial discrete models yields contrary to linear spatial models a non-spherical variance-covariance matrix. An important consequence of the complex variance-covariance structure is that the error term will be heteroskedastic (Anselin, 2002). This renders standard probit or tobit estimation inconsistent. The underlying problem is the (potential) interdependence in the endogenous variable giving rise to

simultaneity. Case et al. (1993) innovated the econometric investigation of this type of strategic interaction in a study of the expenditure levels among US state governments (in the continuous setting). To solve the simultaneity problem in the discrete setting we need to rely on a spatial latent variable approach.[3] Following Fleming (2004), the underlying latent model specification with spatial dependence can be expressed as:

$$\mathbf{dptax^*} = \rho \mathbf{W dptax^*} + \mathbf{x\beta} + \mathbf{u}, \tag{2}$$

The observed variable, $dptax_i$, is a dummy variable identifying local governments with residential property taxation and $dptax_i^*$ is its unobserved latent counterpart. The observed $dptax_i$ equals unity when $dptax_i^*>0$ and is zero otherwise. **W** is a symmetric 301x301 weight matrix, with zeros in the diagonal and with elements w_{ij} different from zero if the two local governments are considered to be neighbors. **X** is a matrix of property tax determinants of every local government, **β** is a vector of parameters and **u** is a vector of error terms which we for now assume to be normally distributed with homoscedastic variance:

$$\mathbf{u} \sim N(0, \sigma_u^2). \tag{3}$$

The spatial weights matrix, **W**, is determined apriori and can be considered as part of local government 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. W_{ij} = $1/m_i$ for all municipalities that are contiguous to municipal *i*, where m_i is the number of observations that are contiguous to municipal *i*. Wdptax* is a weighted average of the propensity for neighboring local governments to levy property taxation. ρ captures interaction in the latent variable which we expect to be statistically different from zero if yardstick competition is a relevant aspect of the property tax determination.

It should be noticed that the strategic interaction in (2) technically implies that it is the neighbor's latent variable (Wdptax*) that matters for local government i, and not neighbors' observed decisions (Wdptax). The straightforward formulation of the interaction is that the observed existence of property taxation depends on the observed property taxation of the

[3] Other studies which pursue different versions of the spatial latent variable approach include Case (1992), Pinkse and Slade (1998), Holloway et al. (2002) and Klier and Mcmillen (2005).

neighbors ($\mathbf{dptax} = \rho\mathbf{W}\mathbf{dptax} + \mathbf{x}\boldsymbol{\beta} + \mathbf{u}$), while a formulation where the propensity to levy property taxation depends on the observed property taxation of the neighbors is an intermediate case ($\mathbf{dptax^*} = \rho\mathbf{W}\mathbf{dptax} + \mathbf{x}\boldsymbol{\beta} + \mathbf{u}$). We estimate the standard probit model with an exogenous spatial lag as an alternative to the latent variable model. Although this model is inconsistent due to simultaneity bias, it lies closer to the underlying theoretical concept of yardstick competition. As will come clear, the strength of the interaction estimated is seriously affected by the formulation applied. As Klier and McMillen (2005:8) point out, only the latent model represents algebraically consistent handling of the endogeneity problem.

Our spatial autoregressive probit model (SARP) given by (2) yields correlation between Wdptax* and the disturbances, even when the latter are iid. The endogeneity problem can easily be seen from writing (2) on reduced form (assuming that $(\mathbf{I}\text{-}\rho\mathbf{W})$ is invertible):

$$\mathbf{dptax^*}=(\mathbf{I}\text{-}\rho\mathbf{W})^{-1}\mathbf{x}\boldsymbol{\beta} + (\mathbf{I}\text{-}\rho\mathbf{W})^{-1}\mathbf{u}\,, \tag{4}$$

implying that

$$E((\mathbf{Wdptax^*})\mathbf{u}') = \mathbf{W}(\mathbf{I}\text{-}\rho\mathbf{W})^{-1}\sigma_u^2 \neq \mathbf{0}\,. \tag{5}$$

Non-spatial probit estimation yields in this case biased and inconsistent estimators. Note that contrary to the linear case, it is complicated to utilize standard Maximum Likelihood (ML) estimation of ρ because the SARP specification given by (2) introduces a non-spherical variance-covariance matrix given by:

$$\mathbf{Cov(u)} = \left[(\mathbf{I} - \rho\mathbf{W})(\mathbf{I} - \rho\mathbf{W})'\right]^{-1}\sigma_u^2\,. \tag{6}$$

The error terms will consequently be homoscedastic only if ρ=0. Contrary to models with continuous dependent variables, the discrete dependent model with heteroskedastic error terms yields inconsistent estimates. There are basically two potential remedies to this problem. Some authors, such as Case (1992) and Pinkse and Slade (1998), have proposed to ignore the off-diagonal elements of the variance-covariance matrix and focus on the heteroscedasticity induced by spatial dependence. This method yields consistent, but not fully efficient estimates of the spatial probit model. To obtain consistent and fully efficient

estimators, one has to deal with multidimensional integrals (Anselin, 2002). Fleming (2004) presents a survey of different simulation techniques available for solving this problem. He concludes that the Bayesian approach based on Lesage (2000) is the most flexible method. We follow the Bayesian approach when empirically analyzing yardstick competition in section 5 and 6.[4]

The Bayesian approach is a Markov Chain Monte Carlo (MCMC) method based on the Gibbs Sampler. This is a data augmenting procedure which provides the linkage between the discrete dependent variable and its latent continuous counterpart. We refer the reader to Lesage (2000) and Fleming (2004) for a complete presentation of the method. A general introduction to the Gibbs sampler can be found in Casella and George (1992). The Gibbs sampler introduces a conditional distribution for the censored variable conditional on all other parameters in the model. This distribution is used to produce a random draw for each value of the dependent variable in the probit specification. Once a sample for the unobserved latent dependent variable is established, the problem reduces to the linear spatial auto-regressive model which can be estimated with traditional ML methods. The Bayesian approach allows for heteroskedastic error terms even after controlling for spatial dependence, ensuring that parameter inconsistency is not driven by heteroskedastic influences (Fleming 2004: 156). This allows (3) to be generalized as:

$$\mathbf{u} \sim N(0, \sigma_u^2 \mathbf{V}),\ \mathbf{V} = diag(v_1, v_2, ..., v_n)\,. \tag{7}$$

Technically the Gibbs sampler proceeds as follows:

1. Start with arbitrary initial values for the parameter vector: $\left(\sigma_u^2, \rho, \beta_1, \beta_2, ..., \beta_k, v_1, v_2, ..., v_n\right)$.
2. Estimate σ_u^2 given all other parameters and the data.
3. Estimate $(\beta_1, \beta_2, ..., \beta_k)$ given all other parameters and the data.
4. Estimate $\left(v_1, v_2, ..., v_n\right)$ given all other parameters and the data.
5. Estimate ρ given all other parameters and the data.

[4] The analysis is carried out using James Lesage's spatial econometric toolbox in the Matlab environment and Tim Thomas' corrected scripts (Lesage, 2003 and Thomas, 2005).

6. Sample the conditional distribution for the latent variable (dptax*) given all parameter values.

This completes one pass of the Gibbs sampler process.[5] The Gibbs sampler process is then repeated a large number of times to derive conditional distributions for all the parameters. The mean of the conditional distribution is the final parameter estimate and the standard deviation of the distribution is used for inference. All MCMC sampling procedures reported below are based on 10000 draws with the first 2000 draws omitted. The first draws are omitted to allow the sampler to achieve a steady-state (the so called 'burn-in period'). Note that estimates based on 1000 draws with the first 200 draws omitted were close to identical to the reported estimates, suggesting that one need not carry out an excessive number of draws in practice.[6] Note that we need to fix one of the unknown parameters in order to identify the other unknowns in the model (Holloway et al. 2002:394). We adopt the usual practice and fix σ_u^2 equal to unity.

An observed spatial pattern in property taxation is not necessarily due to competition among local governments. Also common shocks and unobserved correlates will appear as spatial auto-correlation. In empirical work it is a challenge to separate the spatial auto-regressive probit (SARP) model from the spatial error probit model. With spatially correlated omitted variables, we have a pattern of spatial error of the form:

$$\mathbf{u} = \lambda \mathbf{M}\mathbf{u} + \boldsymbol{\varepsilon}, \tag{8}$$

where ε is a well behaved error term and M is a neighbor matrix. Estimating the SARP model introduced above can in principle lead to a false conclusion of yardstick competition (ρ>0) when ρ=0 holds in the true model. The ability to separate spatial lag from spatial error depends on the quality of the other explanatory variables in (2).[7] Bordignon et al. (2003) argue that yardstick competition is likely to show up as spatial error because the spatial lag model implicitly assumes that tax rates are spatially correlated *independently* of the levels of the other covariates, while the spatial error model tests for correlation of the tax rates which

[5] Lesage (2000) has derived all the conditional distributions for the limited dependent Bayesian spatial models and it is this sampling procedure that is used to obtain parameter estimates.
[6] We have also experimented with 20 000, 30 000 and 50 000 draws. The estimate of ρ does not change.
[7] Anselin et al. (1996) have proposed some LM tests to separate spatial error from spatial lag, but these are not implementable in the discrete endogenous variable case.

cannot be explained by the other covariates. In section 5 we estimate both the spatial lag and the spatial error model and compare which model which best fit the data.

In section 6 we present an extension of the spatial probit analysis and have a look at the determination of the property tax revenue. The endogenous variable here is the annual property tax payment for a standardized house (ptax). The latent spatial tobit specification is given by:

$$\mathbf{ptax^*} = \rho \mathbf{W ptax^*} + \mathbf{x\beta} + \boldsymbol{\varepsilon}. \tag{9}$$

The observed dependent variable, $ptax_i$, is equal to $ptax_i^*$ if $ptax_i^*>0$ and 0 otherwise. In section 6 we present results for both the non-spatial and the Bayesian spatial tobit model (both lag and error specification).

5. The Discrete Choice of Having Property Taxes

The benchmark analysis looks at characteristics of the local governments important to explain the existence of the property tax, ignoring the spatial dimension. Specification A in Table 1 presents the results for the standard non-spatial probit model. The fiscal demand variables included are private income level and central government grants. The likelihood of having property tax decreases with the level of private income. The effect is statistically significant and quantitatively important. Evaluated at the mean of the explanatory variables, one standard deviation increase in private income reduces the probability of levying property tax with approximately 20 percentage points. Since private income represents both a demand effect and is an indicator of the local tax base, the negative coefficient shows that the tax base effect dominates. In the demand framework, higher private income is expected to lead to higher demand for local public services and having property tax is a way of arranging additional revenue. Central government grants have no statistically significant effect. This result is consistent with the flypaper effect.

Political fragmentation (measured by the Herfindahl index, HERF) is shown to influence the choice of property taxation. Higher value of the index means less party fragmentation of the local council. The negative coefficient implies that increased party fragmentation is associated with higher likelihood of having property taxation. The quantitative effect is of political

importance. Evaluated at the mean, one standard deviation increase in party fragmentation increases the likelihood of having property tax by about 5.7 percentage points. In our setting the result is consistent with the understanding that political fragmentation motivates property taxation. The party fragmentation of the local council motivates the introduction of property taxation to improve the incentives of the officials of the local government.

Table 1 about here

The positive relationship between political fragmentation and likelihood of having property taxation may be interpreted in a different context. The studies of political fragmentation and fiscal policy innovated by Roubini and Sachs (1989) emphasize political fragmentation as a source of fiscal inefficiency. Perotti and Kontopoulos (2002) argue that political fragmentation may lead to excessive government and consequently a high tax level. In the Norwegian context, Kalseth and Rattsø (1998) show that political fragmentation in local governments has economic effects, in their data they found excessive administrative spending in fragmented councils. Borge (1995) find that political fragmentation is associated with higher level of user charges. In this understanding our relationship between fragmentation and property taxation may reflect 'political strength'. A strong political leadership may be better able to hold down the tax (and spending) level. The separation between these two explanations is addressed in section 6.

The choice of property taxation also seems to be an ideological issue. The share of socialists in the local council is an important predictor of property taxation. More socialists increase the likelihood of having property taxation. The size of the effect is quite large. Increasing the share of socialists by 10 percentage points, increases the likelihood of having property taxation by 14 percentage points. The average socialist share is 37%, and one standard deviation increase raises the likelihood by about 18 percentage points. The result is consistent with the results of Borge and Rattsø (2004), who study the socialist influence in a model focused on the role of income distribution for the tax structure. Petterson (2004) has shown a similar effect of socialist orientation on the tax level in a Swedish study using the discontinuity method to compare local governments close to 50% socialists.

The model is extended to include the existence of property taxation in neighboring communities. The geographical distribution of the use of residential property taxation as a

local tax shows a clear pattern. The distribution follows to some extent the rural-urban dimension. But we also find significant differences across counties that hardly can be explained along this dimension. As an example we note that none of the municipalities in the counties Vestfold and Akershus levy residential property taxation (see Appendix Table 3). The counties are close to Oslo and most of the local governments have a high private income level.

To take into account strategic interaction among neighboring governments we extend model A to include a spatially lagged dependent variable. The extended formulations are shown in models B and C in Table 1. Model B is a straightforward Probit estimation, ignoring simultaneity, while model C is based on the Markov Chain Monte Carlo (MCMC) technique outlined in section 4. We find that yardstick competition certainly is important to explain the existence of property taxation. The statistical effect is solid in both model B and C. The marginal effect of yardstick competition is overstated when we ignore the inherent simultaneity problem, comparing models B and C. While the naïve Probit estimation finds an estimated reaction function coefficient ($\hat{\rho}$) of 1.72, the MCMC technique estimate is 0.22. The marginal effects are 0.56 and 0.07, respectively, evaluated at the sample averages for the explanatory variables.

While yardstick competition is clearly confirmed in both specifications, the difference in economic impact between the two is substantial. The simultaneous latent formulation indicates that the likelihood that a local government will levy property taxation increases with 2 percentage points if one additional neighbor starts levying property taxation (assuming 4 neighbors). This is hardly of economic importance. The corresponding effect for the naïve probit is 13.5 percentage points, which must be considered to be economically relevant. The difference is expected on theoretical grounds. In the naïve model B it is assumed that local governments take into account the observed property taxation of the neighbors, with a stark difference between those with and those without property taxation. In the latent model C formulation, the local governments take into account the predicted likelihood of having property taxation of the neighbors. This likelihood will show much less variation between local governments, and consequently the interaction effect will be much smaller. Yardstick competition theory suggests that municipalities have incentives to mimick neighboring municipalities, and a model that takes into account *revealed* decisions of neighbors rather than neighboring municipalities' *propensities* to have property taxation is best suited to capture

strategic interaction. The revealed decision model does not offer an algebraically consistent handling of the endogeneity problem. Hence we apply the naïve model B as an illustration of the potential bias due to the spatial latent model formulation. A more conservative approach is to consider $\hat{\rho}_{MCMC}$ to be a lower bound and the $\hat{\rho}_{ML}$ to be an upper bound of the true ρ. As an alternative to the spatial lag model, we also estimate the spatial error probit model with the MCMC approach, reported as specification D in Table 1. Again we find evidence of a geographic pattern in the property taxation decisions. The spatial error probit yields a Pseudo-R^2 and a spatial effect (λ) of the same magnitudes as in model C. We cannot rule out that omitted spatially correlated variables are an important part of the spatial auto-correlation, but our set of control variables do include the factors shown to be of importance in other studies of local taxation in Norway.[8]

Ignoring spatial dependence generally leads non-spatial models to attribute spatial autocorrelation in the dependent variable to explanatory variables rather than assign this variation to spatial dependence. This can potentially yield seriously biased effects in non-spatial models. We find that this is not the case for the discrete choice of property taxation. Comparing model A to model C we find that all marginal effects are only slightly underestimated in the non-spatial probit model.

6. The Determinants of Property Tax Revenue

It is of interest to investigate whether yardstick competition and political fragmentation also influences the level of property taxation in the local governments. As a starting point we have had a look at the demand determinants of the standardized property tax revenue in a simple OLS among the 103 local governments with property taxation (not reported). Central government grants come out as the main determinant of the property tax revenue. Higher grants induce local governments to reduce the property tax level given that they have property taxation. This revenue substitution is the standard result in this kind of studies (see Borge and Rattsø, 2004). The private income level has a negative effect on the property tax level. We interpret this as the effect of higher property tax base associated with higher personal income.

[8] The estimated spatial lag parameter is generally not sensitive to what control variables that are included in our probit specifications (or tobit specifications, reported below). Since the interaction effect does not change much as additional covariates are included in the regression it is less likely to change if we were able to add some of the potentially missing omitted variables. The spatial error parameter is somewhat more sensitive to what control variables that are included.

No political variables have any statistically significant effect on the property tax level given that they have property taxation. It seems that only economic variables influence the size of the property tax revenue given property taxation.

In the combined tobit analysis of the propensity to have property taxation and the level of property tax revenue both economic and political determinants are important. The benchmark tobit analysis without spatial interaction is reported as model E in Table 2. Political fragmentation is shown to be an important determinant of the property tax revenue. Since political fragmentation has no effect on property tax revenue, given property taxation, but has a statistically significant effect in the tobit formulation, we conclude that political fragmentation first and for all is important for the choice of having property taxation or not. This is consistent with the interpretation that political fragmentation motivates having property taxation as an incentive mechanism. We also find statistically significant effects of political ideology and private income level.

Moving on to the spatial tobit specifications we find that property tax revenue certainly is affected by yardstick competition. The average property tax revenue is about NOK 1000 (USD 150) per standardized house. The estimated neighborhood effects in models F, G and H in Table 2, are statistically and economically significant. Again, we find as expected that ignoring simultaneity yields an upward bias in the estimated strategic interaction. Based on the MCMC technique we find an interaction coefficient based on the spatial lag specification of 0.22. The spatial error specification suggests an interaction coefficient of 0.32. The estimates implies that when neighboring local governments increase their property taxation with NOK 1000 per house, then the local government under study increases the property taxation with NOK 220 or NOK 320 according to model formulation. This is similar to what existing European studies of property tax interaction report. Allers and Elhorst (2005), Bordignon et al. (2003) and Solé-Ollé (2003) find reaction coefficients of around 0.3-0.4 studying property tax decisions in a continuous setting in the Netherlands, Italy and Spain, respectively. We interpret the highly statistical significant evidence of spatial auto-correlation provided in table 2 as evidence that local governments look to their geographic neighbors when making property tax decisions. As in the probit case, we find that the estimated effects of the other covariates are not sensitive to controlling for spatial auto-correlation.

Table 2 about here

7. Concluding Remarks

The starting point of the paper is the recent interest in decentralization with property taxation as an incentive mechanism to stimulate efficient resource use in the public sector. Local governments in Norway can choose to have residential property tax, and their choice can inform us about their evaluation of the incentives involved. The standard demand model assumes that property taxes are determined based on the economic tradeoff between the benefit of more services and the cost of higher taxes. Two additional aspects of the discrete choice of having property taxation are investigated, the roles of political fragmentation and yardstick competition. We test the hypothesis that fragmentation and competition influence the decision to have property taxation. Econometric challenges of spatial models with discrete dependent variables are addressed.

The empirical results indicate that fragmentation motivates property taxation to control the associated common pool problems and that yardstick competition generates a distinct geographic pattern in local taxation. In an extension of the analysis we show that these mechanisms are also important for the property tax level. The quantitative effect of the fiscal interaction depends on model formulation. It is a challenge for future research to discriminate between alternative econometric representations of fiscal competition with discrete dependent variables.

References

Allers, M. A. and J. P. Elhorst (2005), Tax mimicking and yardstick competition among local governments in the Netherlands, International Tax and Public Finance 12, 493-513.

Anselin, L., A. K. Bera, R. Florax and M. J. Yoon (1996), Simple diagnostic tests for spatial dependence, Regional Science and Urban Economics 26, 77-104.

Anselin, L. (2002), Under the hood: Issues in the specification and interpretation of spatial regression models, Agricultural Economics 27, 247-267.Besley, T. and A. Case (1995), Incumbent behavior: Vote seeking, tax setting and yardstick competition, American Economic Review 85, 25-45.

Bordignon, M., F. Cerniglia and F. Revelli (2003), In search of yardstick competition: a spatial analysis of Italian municipal property tax setting, Journal of Urban Economics 54, 199-217.

Borge, L.-E. (1995), Economic and political determinants of fee income in Norwegian local governments, Public Choice, 83, 353-373, also in J. Rattsø (ed.) (1998), Fiscal Federalism and State-Local Finance: The Scandinavian Approach, Edward Elgar, Cheltenham, UK.

Borge, L-E. and J. Rattsø (2004), Income distribution and tax structure: Empirical test of the Meltzer-Richard hypothesis, European Economic Review, 48, 4, 2004, 805-826.

Borge, L-E. and J. Rattsø (2005), The relationships between costs and user charges: The case of a Norwegian utility service, FinanzArchiv 61, 1, 1-22.

Borge , L-E. and J. Rattsø (2006), Property taxation as incentive for cost control: Empirical evidence for utility services in Norway, Working Paper no. 12/2006, Department of Economics, Norwegian University of Science and Technology.

Brennan, G. and J. Buchanan (1978), Tax instruments as constraints on the disposition of public revenues, Journal of Public Economics 9, 301-318.

Brennan, G. and J. Buchanan (1980), The power to tax, Cambridge: Cambridge University Press.

Brunner, E. and J. Sonstelie (2003), Homeowners, property values and the political economy of the school voucher, Journal of Urban Economics 54, 239-257.

Carlsen, F., B. Langset and J. Rattsø (2005), The relationship between firm mobility and tax level: Empirical evidence of fiscal competition between local governments, Journal of Urban Economics 58, 273-288.

Case, A.C. (1992), Neighborhood influence and technological change, Regional Science and Urban Economics, 22: 491–508.

Case, A.C., H. S. Rosen and J. R. Hines (1993), Budget spillovers and fiscal policy interdependence, Journal of Public Economics 52, 285-307.

Casella, G. and E. I. George (1992), Explaining the Gibbs sampler, American Statistician 46, 167-174.

De Mello, L. (2004), Can fiscal decentralization strengthen social capital? Public Finance Review 32, 1, 4-35.

Fischel, W. (2001), Homevoters, municipal corporate governance, and the benefit view of the property tax, National Tax Journal 54, 1, 157-174.

Fiva, J. H. and M. Rønning (2006), The incentive effects of property taxation: Evidence from Norwegian school districts, Discussion Paper No. 484, Statistics Norway.

Fleming, M. (2004), Techniques for estimating spatially dependent discrete choice models, in L. Anselin, R. J. G. M. Florax and S. J. Rey (eds.), Advances in Spatial Econometrics, Springer, Heidelberg.

Glaeser, E. (1996), The incentive effects of property taxes on local government, Public Choice 89, 93-111.

Gordon, R. H. and J. D. Wilson (2000), Tax structure and government behavior: Implications for tax policy, mimeo, University of Michigan and Michigan State University.

Hettich W. and S. L. Winer (1999), Democratic Choice and Taxation – A Theoretical and Empirical Analysis, Cambridge University Press, Cambridge, UK.

Holloway, G., B. Shankar and S. Rahman (2002), Bayesian spatial probit estimation: A primer and an application to HYV rice adoption, Agricultural Economics 27, 383-402.

Hoxby, C. M. (1999), The productivity of schools and other local public goods producers, Journal of Public Economics 74, 1-30.

Inman, R. (1989), The local decision to tax, Regional Science and Urban Economics 19, 455-191.

Kalseth, J. and J. Rattsø (1998), Political control of administrative spending: The case of local governments in Norway, Economics and Politics 10, 1, 63-83, also in J. Rattsø (ed.) (1998), Fiscal Federalism and State-Local Finance: The Scandinavian Approach, Edward Elgar, Cheltenham, UK.

Klier, T. and D. P. McMillen (2005), Clustering of auto supplier plants in the U.S.: GMM spatial logit for large samples, mimeo, Department of Economics, University of Illinois at Chicago.

LeSage, J. P. (2000), Bayesian estimates of limited dependent variable spatial autoregressive models, Geographical Analysis, 32, 19-35.

LeSage, J. P. (2003), Econometrics Toolbox, MatLab programs. Downloaded from http://www.spatial-econometrics.com .

Oates, W. (2001), Property taxation and local government finance, Essays in honor of C. Lowell Harris, Cambridge, MA: Lincoln Institute of Land Policy.

Perotti R. and Y. Kontopoulos (2002), Fragmented fiscal policy, Journal of Public Economics, 86, 191-222.

Petterson, P (2004), Do parties matter for fiscal policy choices? A regression-discontinuity approach, mimeo, Department of Economics, University of Stockholm.

Pinkse J. and Slade M.E. (1998), Contracting in space: An application of spatial statistics to discrete-choice models, Journal of Econometrics, 85: 125–154.

Roubini, N. and J. D. Sachs (1989), Political and economic determinants of budget deficits in the industrial democracies, European Economic Review 33, 903-938.

Salmon, P. (1987), Decentralization as an incentive scheme, Oxford Review of Economic Policy 3, 24-43.

Solé-Ollé, A. (2003), Electoral accountability and tax mimicking: the effects of electoral margins, coalition government and ideology, European Journal of Political Economy 19, 685-713.

Thomas, T. S. (2005), Gibb's sampling in the spatial probit, mimeo. Downloaded from http://www.timthomas.net .

Wilson, J. D. and R. H. Gordon (2003), Expenditure competition, Journal of Public Economic Theory 5, 399-417.

Wilson, J. D. and D. Wildasin (2004), Capital tax competition: Bane or boon, Journal of Public Economics 88, 1065-1091.

Table 1
Probit estimates of the discrete choice of having property taxation

	A			B			C			D		
	Coeff	**t-prob**	**Marginal effect**	**Coeff**	**t-prob**	**Marginal effect**	**Coeff**	**p-value**	**Marginal effect**	**Coeff**	**p-value**	**Marginal effect**
SPATIAL LAG (ρ)				1.72	0.00	0.56	0.22	0.00	0.07			
SPATIAL ERROR (λ)										0.32	0.01	0.10
HERF	-2.93	0.10	-0.96	-2.98	0.11	-0.97	-3.69	0.04	-1.20	-4.13	0.05	-1.35
$\overline{y}$	-0.03	0.00	-0.01	-0.02	0.01	-0.01	-0.03	0.00	-0.01	-0.03	0.00	-0.01
G	0.05	0.19	0.01	0.00	0.91	0.00	0.05	0.13	0.01	0.03	0.31	0.01
SOC	4.34	0.00	1.41	3.78	0.00	1.23	5.16	0.00	1.69	5.20	0.00	1.70
$\frac{y_m}{\overline{y}}$	-2.70	0.39	-0.88	-2.47	0.46	-0.81	-3.37	0.20	-1.10	-2.69	0.28	-0.88
POPULATION	0.01	0.22	0.00	0.01	0.29	0.00	0.01	0.06	0.00	0.01	0.06	0.00
CHILDREN	24.94	0.10	8.14	38.49	0.02	12.56	37.53	0.02	12.25	28.47	0.08	9.29
YOUNG	-12.78	0.24	-4.17	-17.34	0.12	-5.66	-14.73	0.14	-4.81	-18.04	0.12	-5.89
ELDERLY	6.56	0.23	2.14	9.38	0.10	3.06	11.61	0.05	3.79	6.15	0.22	2.01
RURAL	-3.47	0.00	-1.13	-3.85	0.00	-1.26	-4.47	0.00	-1.46	-4.54	0.00	-1.48
McFadden R^2		0.29			0.35							
Pseudo R^2								0.66			0.66	
Log likelihood		-138.13			-126.41							
Model		Probit			Spatial lag probit			Spatial lag probit			Spatial error probit	
Estimation method		ML			ML, exogenous lag			MCMC, endogenous lag			MCMC, endogenous error	
# obs.		301			301			301			301	

Note: A constant term is included in all regressions (not reported). Marginal effects are evaluated at sample averages of the explanatory variables.

Table 2
Tobit analysis of the determinants of property tax revenue

	E		F		G		H	
	Coeff.	**p-level**	**Coeff.**	**p-level**	**Coeff.**	**p-level**	**Coeff.**	**p-level**
SPATIAL LAG (ρ)			0.69	0.03	0.22	0.01		
SPATIAL ERROR (λ)							0.32	0.00
HERF	-4913.05	0.06	-4561.97	0.08	-5062.22	0.03	-5582.28	0.03
$\overline{y}$	-46.51	0.00	-40.73	0.00	-47.47	0.00	-49.07	0.00
G	9.92	0.84	5.60	0.91	-3.60	0.47	-26.39	0.35
SOC	6882.03	0.00	6195.67	0.00	6903.96	0.00	6741.48	0.00
$\frac{y_m}{\overline{y}}$	-6408.41	0.18	-4431.92	0.36	-8301.06	0.07	-7642.19	0.11
POPULATION	7.87	0.24	7.58	0.25	9.18	0.10	7.18	0.15
CHILDREN	34667.99	0.14	46806.54	0.05	49889.68	0.02	43711.70	0.05
YOUNG	-17859.71	0.28	-20570.20	0.21	-25998.32	0.08	-35610.17	0.04
ELDERLY	7689.52	0.36	9823.67	0.24	9620.42	0.14	2064.66	0.42
RURAL	-5252.45	0.00	-5297.45	0.00	-5894.90	0.00	-6175.61	0.00
McFadden R^2								
Pseudo R^2					0.544		0.548	
Log likelihood	-1016.73		-1014.43					
Model	Tobit		Spatial lag tobit		Spatial lag tobit		Spatial error tobit	
Estimation method	ML		ML, exogenous lag		MCMC, endogenous lag		MCMC, endogenous error	
# obs.	301		301		301		301	

Note: A constant term is included in all regressions (not reported).

Appendix Table 1
Frequency of property taxation according to population size

Population size	Share of municipalities with property taxation	Number of municipalities	Average property tax payment	Average property tax payment for municipalities with property taxation
<2500	0.02	130	43	2150
>2500 & <5000	0.23	112	355	1543
>5000 & <10000	0.39	90	679	1741
>10000	0.44	99	911	2070
Overall	0.25	431	456	1824

Note: 108 out of 431 observations levy residential property taxation. Only 3 out of 130 municipalities with a population size below 2500 levy residential property taxation.

Appendix Table 2
Data description and descriptive statistics

Variable	Description	Mean	St.dev	Min	Max
ptax	Annual property tax payment for a standardized house in NOK.	634.88	991.84	0.00	4312.00
dptax	Dummy taking the value 1 for local governments levying residential property tax	0.35	0.48	0.00	1.00
W*dptax	Spatially lagged dptax, interpreted as the share of neighbors with residential property taxation.	0.26	0.22	0.00	1.00
HERF	Herfindahl-index measuring political fragmentation of the local council.	0.24	0.06	0.14	0.60
$\overline{y}$	Average before tax income for every person 17 years and older, measured in 1000 NOK.	224.26	24.14	170.00	341.60
G	The sum of lump-sum grants from the central government and regulated income and wealth taxes, measured in 1000 NOK per capita.	23.88	3.32	18.64	35.44
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.	0.37	0.13	0.05	0.72
POPULATION	Total population in thousands (1st of January).	12.56	20.19	2.52	230.95
CHILDREN	The share of the population 0-5 years (1st of January).	0.08	0.01	0.05	0.11
YOUNG	The share of the population 6-15 years (1st of January).	0.14	0.01	0.10	0.19
ELDERLY	The share of the population 67 years and above (1st of January).	0.14	0.03	0.07	0.23
$\frac{y_m}{\overline{y}}$	Income distribution measured as the ratio of median to mean income, based on before tax income.	0.90	0.04	0.73	1.00
RURAL	The share of the population living in rural areas (3rd of November)	0.41	0.23	0.01	1.00

Note: Data description is based on the local governments with population>2500 (N=301). The data used in this analysis are provided by Norwegian Social Science Data Services, Statistics Norway and Arne Sauar. None of them are responsible for the analyses conducted or for the conclusions drawn.

Appendix Table 3
Frequency of property taxation on county level

County	Overall			Population>2500		
	Municipalities with property taxation	Municipalities without property taxation	Average property tax payment	Municipalities with property taxation	Municipalities without property taxation	Average property tax payment
Østfold	4	14	566	4	12	637
Akershus	0	22	0	0	22	0
Hedmark	10	12	782	9	7	988
Oppland	13	13	914	13	8	1132
Buskerud	4	17	179	4	13	221
Vestfold	0	14	0	0	13	0
Telemark	10	8	1212	10	3	1677
Aust-Agder	2	13	249	2	6	466
Vest-Agder	2	13	280	2	8	420
Rogaland	9	17	561	9	12	695
Hordaland	6	27	299	6	19	407
Sogn og Fjordane	6	20	355	5	13	379
Møre og Romsdal	6	30	336	6	22	413
Sør-Trøndelag	5	20	332	5	14	437
Nord-Trøndelag	5	19	578	5	8	1067
Nordland	11	34	494	11	8	1171
Troms	7	18	402	7	5	838
Finnmark	8	11	629	7	3	1020
Overall	**108**	**323**	**458**	**105**	**196**	**635**

Chapter 5

New Evidence on the Effect of Fiscal Decentralization on the Size and Composition of Government Spending

New Evidence on the Effect of Fiscal Decentralization on the Size and Composition of Government Spending

Jon H. Fiva*

Received 10 November 2005; in revised form 13 February 2006; accepted 16 February 2006

This paper adds to the literature by utilizing improved data on tax revenue decentralization to reexamine the relationship between fiscal decentralization and the size of government. An econometric analysis using panel data from 18 OECD countries shows that fiscal decentralization matters for both the size and the composition of government spending. Tax revenue decentralization is associated with a smaller public sector, while expenditure decentralization is associated with a larger public sector. The results indicate that the former effect is driven by a reduction in social security transfers, while the latter effect is driven by increased government consumption.

Keywords: fiscal federalism, subcentral fiscal autonomy, size of government, composition of government

JEL classification: H 11, H 53, H 77

1. Introduction

Early contributions to the theory of fiscal competition emphasize the possibility that interjurisdictional competition within a country leads to inefficiently low levels of taxes and expenditures (as formalized by Wilson, 1986, and Zodrow and Mieszkowski, 1986). Based on similar reasoning, there is a large literature going back to Stigler (1957) and Musgrave (1959) that warns against the consequences of decentralized responsibility for redistribution. Another strand of literature stresses that governments do not always act in the best interest of the citizens, and that fiscal competition may help to constrain a public sector that would otherwise be inefficiently large (the

* This work was initiated while I was visiting the Institute for Quantitative Social Science at Harvard University. Their hospitality, as well as funding from the Norwegian Research Council under the FIFOS program, is gratefully acknowledged. Previous versions of this paper have been presented at the Norwegian–German seminar on Public Economics, 2005, at the Norwegian National Economist Meeting, 2006, and at a department seminar in Trondheim. I wish to thank Jørn Rattsø, Agnar Sandmo, Robert Schwager, and two anonymous referees for helpful suggestions and comments. I also wish to thank Dan Stegarescu for making his data on fiscal decentralization available.

argument of Brennan and Buchanan, 1980). Since households are more mobile among jurisdictions within a country than among countries, all these theories suggest that the size of the public sector is expected to vary inversely with the extent of fiscal decentralization.

Leaving aside the welfare consequences, a large empirical literature, initiated by Oates (1985), has looked for downward pressure on taxes and spending from decentralization of fiscal powers. Although a myriad of studies have emerged since Oates's seminal contribution, an empirical consensus have not been reached. The econometric analyses can be divided into two groups: those who focus on variation in decentralization across subcentral units within countries, and those who focus on variation across countries.[1] A major problem with almost all of the latter is that they rely on a problematic measure of fiscal decentralization. These studies typically rely on the Government Finance Statistics (GFS) of the International Monetary Fund (IMF), and describe the degree of fiscal decentralization as the subcentral share of total government spending or revenue . Although the GFS provides consistent definitions across countries and over time, the data set fails to address properly the intergovernmental fiscal structure of countries, and in particular ignores the degree of central government control over local tax rates and tax bases. Strict use of account data may consequently give rise to confounded results because the correspondence between budgetary items and actual decision-making may be imperfect. Although this is widely accepted, almost all cross-country analyses rely purely on GFS data to study the relationship between fiscal decentralization and the size of the public sector, including Anderson and van den Berg (1998), Ehdaie (1994), Jin and Zou (2002), and Oates (1985).[2]

The current analysis is novel in several ways. First, improved data on fiscal decentralization is introduced, and the standard regression evaluating the relationship between government size and decentralization is reexamined. Contrary to previous studies, the new data set, based on Stegarescu (2005), differentiates between revenue of subcentral government levels according to their ability to determine revenue sources autonomously. Second, I focus on how fiscal decentralization affects different parts of the public sector, in particular how it affects spending on social security transfers and government consumption. The former can be argued to be more redistributive in nature

1 Feld et al. (2003) present an extensive literature review.

2 A notable exception is Rodden (2003). The measurement problems connected with the IMF data are further discussed by Ebel and Yilmaz (2003), Rodden (2003, 2004), and Stegarescu (2005) and are also identified by Oates (1989) as an important challenge for future research: "in view of the forementioned reservations concerning the IMF data, I would have much more confidence in my finding of an absence of any relationship between fiscal centralization and public sector size at the national level were it confirmed by another study using a new data set" (1989, p. 582).

and might consequently be differently affected by fiscal decentralization than the latter. On theoretical grounds, countries with decentralized responsibility for redistribution find it harder to redistribute between households, because generous redistributive programs serve to attract low-income households and chase away those with higher incomes, whose taxes must finance the transfers. Third, a substantial part of the fiscal federalism literature typically assumes, implicitly or explicitly, that lower levels of government both collect taxes and spend funds, so regional authorities can be classified as low-tax–low-services or high-tax–high-services (Bardhan, 2002). This assumed connection between local revenues and spending can be quite problematic, since many countries have a tendency towards vertical fiscal imbalance. Evaluating the size and composition of government, the current study stresses that it is important to distinguish between decentralization of taxing powers and of spending powers.

The empirical analysis is based on panel data from 18 OECD countries[3] over the period 1970 to 2000, where period averages are utilized to prevent business-cycle fluctuations from creating a spurious relationship between decentralization and government spending. Consistent with recent studies that take the distinction between different types of decentralization seriously, notably Jin and Zou (2002), Rodden (2003), and Stein (1999), I find an asymmetric effect of tax revenue decentralization and expenditure decentralization on government spending. Oates's conclusion that it "makes little difference whether we use a revenue or expenditure measure of the extent of fiscal centralization" (1985, p. 754) does not hold for the new and improved indicator of tax revenue decentralization. The econometric analysis suggests that tax revenue decentralization depresses the total size of government (as suggested by fiscal competition theory), while expenditure decentralization is associated with a larger public sector. This is interpreted to be a result of vertical fiscal imbalance, which attenuates the link between financing of the public sector and its performance. Such vertical fiscal imbalance creates a common-pool problem while simultaneously allowing public officials to ignore the financial consequences of competition for mobile tax bases and poor provision of public services.

Evaluating the two main parts of overall government expenditures – transfers and government consumption – I find that the asymmetric effect on tax revenue and expenditure decentralization seems to be driven by two different parts of government expenditures. Social security transfers decrease in revenue decentralization, but are independent of expenditure decentralization.

3 The 18 countries included in the analysis are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Government consumption is independent of tax revenue decentralization, but increases in expenditure decentralization.

The rest of the paper is organized as follows. Section 2 presents the theoretical framework and the main hypotheses. Section 3 describes the data on fiscal decentralization, and section 4 introduces data on government spending and presents the econometric design. In section 5 the results are presented; section 6 carries out some sensitivity analysis. Section 7 discusses the results in relation to the theoretical literature on fiscal competition. Section 8 concludes.

2. Theoretical Framework

2.1. Fiscal Decentralization and the Size of Government

Two different approaches, rooted in two contrasting views of public-sector decision-making, have typically been applied to analyze the effect of fiscal competition between horizontally related governments. One strand of literature has maintained that, assuming benevolent policymakers who seek to maximize the "well-being of society," fiscal competition can create a welfare-reducing race to the bottom in public-good provision. Brennan and Buchanan (1980) challenge the notion that tax competition is welfare-reducing. Starting with the assumption that governments are revenue-maximizing Leviathans, they argue that emigration imposes a serious restriction on the ability of government to exploit taxes. It follows that decentralization of the public sector introduces elements of competition that contribute to contain agency problems. This is the argument underpinning the famous Leviathan hypothesis: "total government intrusion into the economy should be smaller, ceteris paribus, the greater the extent to which taxes and expenditures are decentralized" (Brennan and Buchanan, 1980, p. 185).

Brennan and Buchanan emphasize that the Leviathan hypothesis should be evaluated for a given extent of *collusion* among governmental units. One obvious form of collusion would be agreements between subcentral and central government about revenue-sharing programs, where the subcentral government cedes taxing powers to the central government and receive grants in return (Grossman, 1989; Ehdaie, 1994). Brennan and Buchanan (1980, p. 183) conclude that such an arrangement is undesirable "because it subverts the primary purpose of federalism, which is to create competition between jurisdictions." Clearly, decentralization of expenditures without accompanying decentralization of revenues is unlikely to generate any beneficial competition to restrain the Leviathan. The broader problem related to such vertical fiscal imbalance is the attenuated link between financing and performance of the public sector, together with the possibility for subcentral

governments to impose their costs on residents outside their jurisdiction. Thus, based on the Leviathan hypothesis, it is reasonable to expect decentralization of spending powers (*ceteris paribus*) to be positively and decentralization of taxing powers (*ceteris paribus*) to be negatively associated with the size of government.

Note that other links between fiscal decentralization and government size may also exist: (1) because decentralization provides a better match between the population's preferences and public tax-expenditure bundles (as captured in the decentralization theorem of Oates, 1972)[4] or (2) because political agents at the subcentral level are better able to tailor public goods to their constituency's needs (Oates, 1972), or (3) because decentralization increases the accountability and visibility of public officials, which may lead to more competent and less corrupt government.[5] On theoretical grounds it is not clear how these three mechanisms affect the size of the public sector. Less waste in the public sector is not necessarily associated with a smaller public sector. A more efficient public sector implies lower marginal costs of public services, which leads residents to increase their demand for these expenditures. As a result, the total size of government may increase.

2.2. Fiscal Decentralization and the Composition of Government

An important issue in evaluating the effect of fiscal decentralization on the size of government, which seems to have been neglected in the previous literature, is that decentralization may have different effects on different parts of the public sector.[6] Keen and Marchand (1996) show that fiscal competition may lead not only to inefficient levels of aggregate public expenditures, but also to systematic inefficiencies in the composition of public expenditures. They present a theoretical framework with a benevolent planner and focus on two parts of public spending: The first is a local public good, such as consumption of social services or redistributive payments from altruistic rich households to poor households. The second is a local public input in the economy's production function and corresponds, for example, to infrastructure spending. Assuming immobile workers and mobile firms, Keen and Marchand show that, holding the size of the public sector constant, welfare

4 In its purest form, a centralized system provide a "one size fits all" public-sector outcome that does not reflect local needs, while in a decentralized system, local governments offer different public tax–expenditure bundles, which mobile households can choose between by "voting with their feet."

5 Utilizing cross-country data, Fisman and Gatti (2002) find that decentralization is associated with lower levels of corruption.

6 Faguet (2004) is to some extent an exception. He evaluates how decentralization changed local investment patterns in Bolivia.

could be increased by a rebalancing of expenditures from publicly provided inputs towards provision of local public goods that benefit immobile residents: "the picture that emerges is thus one in which fiscal competition leads to too many business centers and airports but not enough parks or libraries" (Keen and Marchand, 1996, p. 35).

Assuming immobile households, Keen and Marchand provide one account of why fiscal competition may put downward pressure on welfare spending. In addition there is a large literature in public finance, going back to Stigler (1957) and Musgrave (1959), that warns against the consequences of decentralized responsibility for redistribution exactly *because* households are mobile. The idea is that policies that are redistributive in nature give rise to a phenomenon that resembles adverse selection: Net beneficiaries of redistributive policies are attracted to generous jurisdictions, while net contributors are repelled (Wildasin, 1991). This kind of reasoning led Stigler (1957, p. 217) to the conclusion that "redistribution is intrinsically a national policy." The key point is that decentralized responsibility for redistribution without any corrections induces each jurisdiction to choose its policy in isolation, ignoring the positive external benefits it creates for other jurisdictions. Generally this yields redistribution levels lower than socially desirable, possibly leading to a race to the bottom.

3. Measuring Fiscal Decentralization – New Data on Decentralization of Taxing Powers

Fiscal decentralization reflects how responsibilities for tax revenues and public expenditures are distributed among different tiers of government. The complexity of vertical government structures make this notion challenging to quantify. A reliable measure of fiscal decentralization needs to effectively quantify the activities of subcentral governments arising from their autonomous decisions. The standard approach in cross-country analyses is to make use of accounting measures of revenue and expenditure shares for subcentral relative to general government as a proxy for fiscal decentralization. Until recently the data from the IMF's GFS was the only available cross-national time-series data to generate these measures. Although these measures have the advantage of being operational, they can give rise to seriously biased results (Ebel and Yilmaz, 2003).

The tax revenue decentralization measure provided by the GFS indicator does not distinguish between locally determined taxes, taxes regulated by the central government, taxes levied as surcharges on national taxes, and shared taxes. Whether subcentral governments' expenditure is funded by intergovernmental grants, some revenue-sharing program, or own-source revenue

through independent taxes and user charges clearly makes a difference. The GFS measure of tax revenue decentralization will consequently overestimate the true extent of subcentral taxing autonomy. The GFS measure of decentralization of spending powers is also likely to overestimate the true nature of spending autonomy, since central governments may influence subcentral decisions through directives, etc. Local expenditures that are mandated by the central government or are spent on behalf of the central government appear as subcentral expenditures, even though subcentral governments may have no autonomy in these spending decisions.

OECD (1999) tries to overcome the first of these measurement problems and present cross-country data that explicitly focus on the role of taxation in determining the fiscal autonomy of subcentral governments. The study aimed to classify taxes in terms of the kind of autonomy they provided to state and local governments, hence focusing on tax revenue decentralization. Stegarescu (2005) draws on the analytical framework provided by OECD (1999) and expands its data set to cover 23 OECD countries from 1965 to 2001.[7] Stegarescu's data distinguishes between different kinds of subcentral government revenue according to the degree of discretion subcentral governments have in determining them autonomously. In this respect the data represents a major improvement on existing measures of fiscal decentralization.[8] The second measurement problem, which concerns subcentral government's actual autonomy of expenditure decisions, remains unsolved.

As discussed in section 2, decentralization of spending and taxing powers may have an asymmetric effect on government expenditures. I have consequently chosen to rely on both the improved measure of tax revenue decentralization and the potentially problematic measure of expenditure decentralization from the GFS in the following analysis. This leaves an asymmetry between the accuracy of the two measures available, which may be problematic. I have nonetheless chosen this strategy to stay as close as possible to theory. Incorporating an improved measure of decentralization of spending powers is an avenue for future research.

The key explanatory variables in the empirical analysis conducted below are *TaxRevDec* and *ExpDec*. *TaxRevDec* measures the revenue share of subcentral government relative to general government, but, contrary to what is common in the literature, this variable only includes revenues where the

7 Contrary to the OECD study, Stegarescu (2005) considers not only subcentral governments' autonomy of taxes, but also their size relative to general government.

8 Stegarescu (2005) finds that the GFS measure of tax revenue decentralization overestimates the extent of fiscal decentralization. This is particularly the case for Austria (28.4% versus 3.5%), Belgium (44.4% versus 24.6%), Germany (49.4% versus 7.3%), and Portugal (8.7% versus 3.2%). The percentages refer to data from 1999 and 2000.

subcentral government has discretion over tax rate, tax base, or both. *ExpDec* is measured as the share of subcentral to general government expenditure, and is based on the GFS. Table 1 summarizes the descriptive statistics for *TaxRevDec* and *ExpDec*. Countries are on average more decentralized in the expenditure than in the revenue dimension (34% versus 21%). But the difference may be exaggerated, since expenditure decentralization is likely to be overstated. The correlation between the two variables is 0.7.

Focusing on the more reliable measure of fiscal decentralization, *TaxRevDec*, the 18 countries can be divided into three groups with respect to decentralization trends in the period under study (1970–2000).[9] A clear trend towards an increasing role for subcentral governments can be observed particularly for Belgium, France, and Spain, but also for Denmark, Japan, Portugal, and Sweden;[10] while three countries – Ireland, Norway, and the U.K. – have moved in the opposite direction, toward less subcentral tax autonomy. The remaining eight countries, including the traditional federal countries – Australia, Austria, Canada, Germany, Switzerland, and the U.S., have had a fairly stable degree of tax revenue decentralization from 1970 to 2000. The trends seem to reflect very well the institutional changes that have taken place in these countries (Stegarescu, 2005).

Figures 1 and 2 show the trends in the tax revenue decentralization indicator based on 5-year averages, separated into traditional federal and unitary countries. Figure 2 shows that the traditional federal countries underwent no significant changes during the last 30 years with respect to decentralization of taxing powers. In the empirical analysis, estimations both with and without these countries are reported.

4. Econometric Specification

The best empirical strategy to study the effect of fiscal decentralization on public-sector spending would be to find some sort of "natural experiment" in which some countries have radically altered their vertical government structure, and evaluate in particular how these reforms have changed government spending. During the time period that I study, some such reforms have been implemented in some of the countries. To identify the effects of

9 Five countries are excluded from Stegarescu's data set, because of size (Luxembourg and Iceland), uncertainty with respect to data availability (Greece and Italy), or missing data on the dependent variables (New Zealand).

10 Note that considerable differences in trends between the two measures of fiscal decentralization are observed. Belgium and France, for example, have increased their subcentral share of tax revenue considerably in the period under study (from 7% to 24% and from 2% to 20%, respectively) while their expenditure decentralization remains basically unaltered.

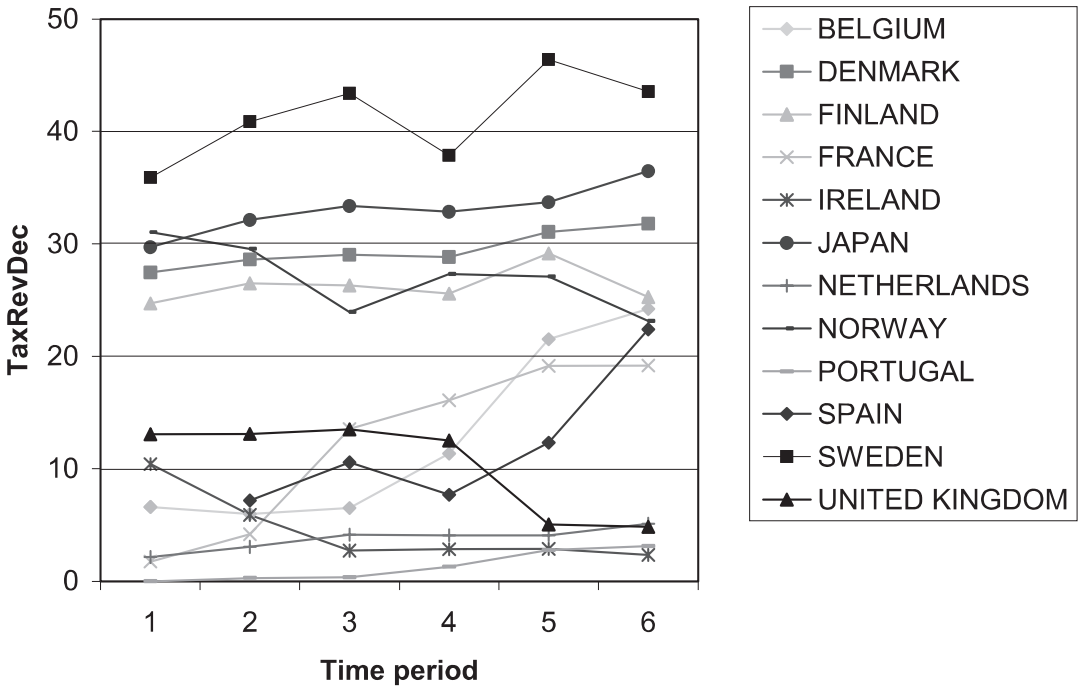
Table 1

Descriptive Statistics for the Measures of Fiscal Decentralization

Country	Tax Revenue Decentralization[a]					Expenditure Decentralization[a]				
	Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum	Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum
Australia	20.35	1.69	0.08	18.84	23.09	41.23	0.99	0.02	40.11	42.63
Austria	3.44	0.12	0.04	3.20	3.54	30.85	0.70	0.02	29.88	31.80
Belgium	12.68	8.18	0.64	5.94	24.24	11.90	1.15	0.10	10.97	13.65
Canada	51.73	1.97	0.04	48.21	54.22	57.58	0.95	0.02	56.34	58.82
Denmark	29.46	1.64	0.06	27.44	31.80	45.42	1.74	0.04	43.56	48.00
Finland	26.25	1.57	0.06	24.71	29.15	37.95	2.07	0.05	35.11	40.11
France	12.30	7.59	0.62	1.72	19.17	18.07	2.36	0.13	16.47	22.81
Germany	7.46	0.35	0.05	6.81	7.77	42.02	2.22	0.05	39.26	45.65
Ireland	4.50	3.16	0.70	2.34	10.39	25.21	1.90	0.08	23.32	28.28
Japan	33.05	2.21	0.07	29.71	36.48	43.46	0.00	0.00	43.46	43.46
Netherlands	3.76	1.03	0.27	2.13	5.12	25.09	1.43	0.06	23.34	26.96
Norway	27.02	3.08	0.11	23.14	31.05	34.66	2.81	0.08	31.81	38.90
Portugal[b]	1.55	1.32	0.85	0.28	3.10	8.74	3.95	0.45	3.46	12.41
Spain[b]	12.01	6.17	0.51	7.17	22.40	23.02	9.02	0.39	10.14	31.69
Sweden	41.33	3.90	0.09	35.91	46.39	37.83	4.17	0.11	33.25	44.07
Switzerland	56.84	1.82	0.03	53.88	59.06	51.77	3.76	0.07	47.30	56.86
United Kingdom	10.34	4.20	0.41	4.83	13.50	25.52	3.25	0.13	21.90	31.03
United States	37.24	1.04	0.03	35.99	38.81	44.90	2.29	0.05	41.44	47.91

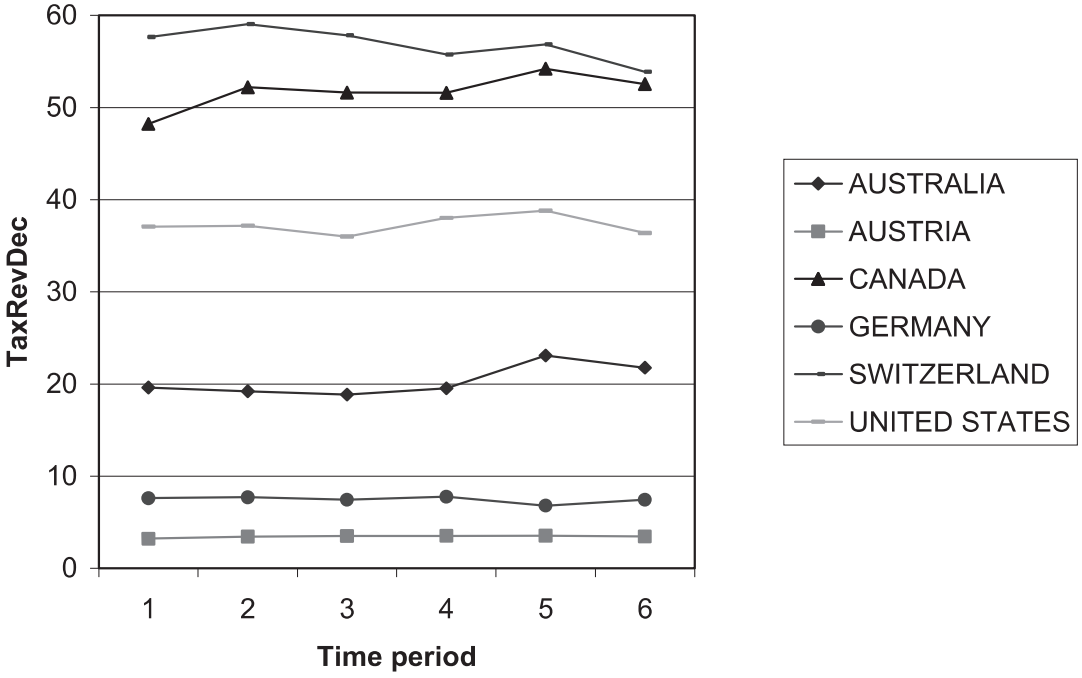
Notes: [a] Tax revenue decentralization is based on Stegarescu (2005), and expenditure decentralization is based on GFS data, period averages.
[b] Data before 1977 are not included for Portugal and Spain. There are additionally eight missing variables on *ExpDec* (five periods for Japan, and one period each for Belgium, Portugal, and Switzerland).

Figure 1
Trends in Tax Revenue Decentralization for Traditional Unitary Countries



Note: 5-year averages, 1970–2000. First period: 1970–1976.

Figure 2
Trends in Tax Revenue Decentralization for Traditional Federal Countries



Note: 5-year averages, 1970–2000. First period: 1970–1976.

these reforms I rely on the tax revenue indicator, *TaxRevDec*, introduced in section 3, to work as a proxy. This indicator changed considerably in (for example) Belgium in 1989, France in 1980, Portugal in 1989, and Spain in 1997, indicating that it captures reforms taking place in these countries well.

Utilizing panel data, inference can be based on variation across countries and/or variation within countries. There are two arguments for relying primarily on the latter: first, because inherent features of different countries that affect government spending, but are not captured in any of the included regressors, yield biased cross-country estimations; second, because fiscal decentralization probably is measured more consistently over time within countries than across countries. The problem with the within-country approach is that vertical government structure varies considerably more across countries than within countries (as illustrated in figures 1 and 2). Thus, basing inference purely on within-country variation removes a lot of variation in the data. In the empirical analysis presented below, I present estimates based on both cross-country and within-country variation.

The standard approach – "searching for Leviathan" in the spirit of Oates (1985) – is to regress some measure of government size on expenditure or tax revenue decentralization and a set of control variables. I reexamine the relationship between government size and fiscal decentralization, utilizing new data on subcentral fiscal autonomy. The econometric specification is given by

$$\begin{aligned} GovernmentSize_{it} = \alpha_1 + \beta_1 TaxRevDec_{it} + \delta_1 ExpDec_{it} \\ + \boldsymbol{\gamma}_1 \mathbf{controls}_{it} + u_{it}\,, \end{aligned} \tag{1}$$

where $GovernmentSize_{it}$ is government spending as a share of GDP in country i at time t, β_1 and δ_1 measure the effect of fiscal decentralization on public-sector size and are the coefficients of interest, and u_{it} is an i.i.d. error term. Since *ExpDec* may overestimate the true extent of expenditure decentralization for some countries, I report results both with and without this variable. To take into account all other potentially important determinants of government expenditures that might be correlated with fiscal decentralization, a matrix of **controls** is included. These are elaborated below. Descriptive statistics are included in appendix tables 7 and 8.

As emphasized in section 2, the effects of fiscal decentralization may differ according to the extent that the public spending enters as an input into the production function. It may also be reasonable to expect the effects to differ according to the redistributive effect of different kinds of government spending. Hence, separating public spending according to the United Nations Classification of the Functions of Government (COFOG) could be useful. Unfortunately, there is, as far as I know, no reliable longer time series available in the cross-country setting for this classification. Thus, as

a first investigation, the current analysis focuses on the two main parts of government expenditures: social security transfers (*Transfers*) and government consumption (*GovernmentConsumption*). Like the general measure of the size of government, these variables are based on OECD data. *Transfers* is defined as "benefits for sickness, old-age, family allowances, etc., social assistance grants and welfare benefits paid by general government" and is commonly used in the welfare-state literature (see, for example, Garrett and Mitchell, 2001; Huber and Stephens, 2001; Rodrik, 1997, 1998; and Swank, 2002). *GovernmentConsumption* is defined by the OECD as "expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services." Due to the difficulty of valuing government services, this measure is related to the cost of government services, including most significantly the wage bill. Some of the dominant categories in government consumption are spending on public administration, public order, education, health, and national defense (Rodrik, 1998).

Comparing the period 1970–1976 with the period 1996–2000, we find that most countries have expanded their spending on consumption, transfers, and overall spending relative to GDP. The data reveals large cross-country differences, but also considerable within-country differences. The average spending on transfers out of GDP increased from 10.7% in 1970–1976 to 14.5% in 1996–2000, peaking in the mid 1990s. *GovernmentSize* and *GovernmentConsumption* exhibit similar trends. Although *Transfers* is not a perfect measure of welfare spending, it is reasonable to argue that it captures important aspects of the welfare state, in particular the effort to carry out redistribution. To identify the effects of fiscal decentralization on *Transfers* and *GovernmentConsumption*, I estimate the following two specifications:

$$Transfers_{it} = \alpha_2 + \beta_2 TaxRevDec_{it} + \delta_2 ExpDec_{it} + \boldsymbol{\gamma}_2 \mathbf{controls}_{it} + \varepsilon_{it}\,, \tag{2}$$

$$GovernmentConsumption_{it} = \alpha_3 + \beta_3 TaxRevDec_{it} + \delta_3 ExpDec_{it} + \boldsymbol{\gamma}_3 \mathbf{controls}_{it} + \eta_{it}\,, \tag{3}$$

where ε_{it} and η_{it} are i.i.d. error terms. Pooling all the data and running an ordinary least-squares (OLS) regression on (1), (2), and (3) provide consistent and unbiased results only if the error terms can be considered to be random across countries and over time. This is a strong assumption to make. A potential remedy is to estimate a restricted version of (1), (2), and (3) that includes a full battery of time and country fixed effects (FE). Such FE estimation removes a lot of variation in the data and consequently reduces the signal-to-noise ratio, which in effect is likely to bias the estimates towards zero. On the other hand, fiscal decentralization is probably measured more

consistently over time within countries than across countries. This is a strong argument for relying primarily on FE estimation. In the empirical analysis, presented in section 5, both approaches are followed.[11]

Although the data set provided by Stegarescu (2005) represents an improvement relative to existing data, it is not flawless. In particular, one might worry that tax revenue decentralization will be sensitive to business-cycle fluctuations due to differing elasticities of the tax base of subcentral and central government, even when the assignment of competencies remains unchanged. To prevent such business-cycle fluctuations from creating a spurious relation between decentralization and government expenditures, I base the regressions on period averages for all variables.[12] A period is defined as five consecutive nonoverlapping years between 1970 and 2000.[13] Introducing period averages reduces the measurement problem induced by business cycles. In addition I include several macro variables as controls: the unemployment rate (which will also capture direct entitlement pressures), GDP per capita, and economic growth.

In addition to the macro variables, it is obviously important to control for other variables that may be correlated with both decentralization and government spending. Previous studies focus on a number of explanatory variables. Rodrik (1998) finds that one of the most important determinants of government spending is the economy's exposure to trade. In addition, demographic and structural characteristics are often found to have an effect on public-sector spending. Consequently I control for *Openness*, country size (*Population*), and the shares of people who are living in rural areas, who are under 15 years old, and who are over 65 years old. In addition to these proxies for political demand, I also control explicitly for partisanship by including the share of the cabinet from left and center parties.

Previous research has found a negative relationship between a simple dummy for federal political systems, as defined according to (for example) Riker (1964),[14] and government spending. Cameron (1978), for example, whose main contribution was to discuss the role of an open economy in promoting public spending, found that federalism "dampens the degree of expansion in the public economy." Federalism is often suggested as a way of reducing the role of the state in general, by fragmenting central authority and

11 As a robustness test I also check whether my FE estimations are robust to the exclusion of the federal countries, which have had a stable vertical government structure from 1970 to 2000.

12 Note that the panel-data studies by Jin and Zou (2002) and Rodden (2003) based their inference on year-to-year changes.

13 The first period consist of six years, 1970–1975.

14 A federal country has, according to Riker (1964), at least two levels of government, of which each must have "at least one area in which it is autonomous." This must be formally guaranteed in, for instance, a constitution (Riker, 1964; Treisman, 2002).

introducing more interjurisdictional competition and checks and balances (Bardhan, 2002).[15] Consequently it is of interest to investigate whether the effect of decentralization is robust to the inclusion of a simple dummy for federalism.[16] Note that because there is time variation in federalism only for one country (Belgium), inference must be based on cross-country variation, which is vulnerable to omitted-variable bias.

5. Results

Table 2 displays the benchmark results. The results are based on period averages for 18 countries, 1970–2000, where a full set of period dummies are included to soak up common period-specific shocks. Two different versions of the specifications (1), (2), and (3) in section 4 are estimated: one where tax revenue decentralization enters alone, and one where tax revenue decentralization and expenditure decentralization enter simultaneously, in addition to all other controls. Specifications (1) and (2) in table 2 are reinvestigations of the classic Oates (1985) model, relying on pooled panel data from OECD countries and the improved tax revenue indicator. Controlling for expenditure decentralization, tax revenue decentralization is negatively associated with size of government. Expenditure decentralization, on the other hand is, *ceteris paribus*, associated with a larger public sector. Contrary to what Oates (1985) finds, it does seem to matter whether expenditure or tax revenue decentralization is used as a proxy for fiscal decentralization.

According to specification (2) in table 2, it is not decentralization *per se*, but only fiscal federalism accompanied by decentralization of tax authority, that can be expected to reduce the size of government. I interpret this as a consequence of vertical fiscal imbalance. Vertical fiscal imbalance is typically bridged through intergovernmental transfers and consequently associated with soft budget constrains. Vertical fiscal imbalance also yields incentives for local jurisdictions to push for high taxes at the central level, which in turn yields expenditures with regionally concentrated benefits. Both mechanisms introduce the possibility for subcentral governments to impose their costs on residents outside the jurisdiction. Generally, vertical fiscal imbalance is associated with less accountability and with bureaucrats and politicians who have weaker incentives to care about the financial consequences of fiscal competition and poor provision of public services. Thus,

15 Rodden (2004) speculates that the negative effect of a dummy for federal countries on government spending might have to do with the *status quo* bias among federations due to multiple veto players in the era of welfare-state expansion.

16 The following countries were coded as federations: Australia, Austria, Belgium (since 1993), Canada, Germany, Spain, Switzerland, and the United States.

consistent with Brennan and Buchanan's (1980) collusion argument, it is not surprising that expenditure decentralization, for given extent of tax revenue decentralization, is associated with a larger public sector. However, alternative mechanisms may give similar results. Voters may simply demand a larger public sector if there is less waste when the production of public services is decentralized.

The asymmetric effect of the two measures of decentralization is consistent with the central findings of recent studies that take the distinction between different types of decentralization seriously, notably Jin and Zou (2002), Rodden (2003), and Stein (1999). These studies suggest that vertical fiscal imbalance is an important determinant of the size of the public sector. Jin and Zou (2002) utilize panel data from developed and developing countries from the GFS. They estimate models where expenditure decentralization and tax revenue decentralization enter separately and find that expenditure decentralization increases the aggregate size of government, while tax revenue decentralization restricts it. Jin and Zou also find that a measure of vertical fiscal imbalance (the percentage of subcentral government expenditure that is financed with grants) is positively associated with public-sector size. Utilizing a similar panel data set, Rodden (2003) also finds that governments tend to grow faster when subcentral governments are more dependent on grants.[17] Finally, Stein (1999), employing cross-country data from Latin America, finds that countries with larger vertical fiscal imbalance tend to have larger governments.

A first attempt at explaining how different parts of the public sector are affected by fiscal decentralization is presented in specifications (3) to (6) in table 2. Interestingly, it seems like transfers and government consumption are differently affected by fiscal decentralization. Social security transfers decrease in tax revenue decentralization, while no statistical significant effect is found for expenditure decentralization. Government consumption portrays a different picture: Tax revenue decentralization is not important, while expenditure decentralization increases government consumption. This suggests that the asymmetric effect of the two measures of fiscal decentralization on overall government spending can be traced back to differing effects on components of the government spending.

The cross-country estimations suggests that an increase in tax revenue decentralization by 1 standard deviation (17 percentage points) decreases total government expenditures and transfers by around 2 percentage points of GDP. This corresponds to 0.2 and 0.4 standard deviation in total gov-

17 In an extension, Rodden utilizes information from the OECD (1999) analysis to distinguish between subcentral governments' ability to set the tax rate and tax base autonomously. His cross-country estimations suggest a negative relationship between tax revenue decentralization and public-sector size.

Table 2

Fiscal Decentralization and Government Spending, Ordinary Least Squares Estimates

	Government Size				Transfers				Government Consumption			
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
TaxRevDec	−0.016	0.045	−0.124**	0.054	−0.082***	0.024	−0.111***	0.028	0.023	0.024	−0.039	0.027
ExpDec			0.251***	0.076			0.061	0.040			0.151***	0.039
Federation	−6.193***	1.324	−7.438***	1.404	−1.605**	0.703	−2.302***	0.738	−4.131***	0.709	−5.391***	0.713
Unemployment	0.168	0.211	0.225	0.206	0.318***	0.112	0.318***	0.108	0.045	0.113	0.031	0.105
GDP_95us	−1.749	1.187	−2.268*	1.267	1.488**	0.630	1.542**	0.666	−1.143*	0.635	−1.394**	0.644
Growth	−1.627***	0.568	−1.968***	0.590	−0.842***	0.302	−1.103***	0.310	−0.727**	0.304	−0.986***	0.300
Openness	0.089***	0.033	0.112***	0.032	0.036**	0.017	0.037**	0.017	0.014	0.018	0.027	0.016
Population	−0.031	0.040	−0.030	0.044	−0.004	0.021	0.009	0.023	−0.035	0.021	−0.013	0.022
$(Population)^2$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rural population	−0.071	0.049	−0.046	0.051	0.051*	0.026	0.076***	0.027	−0.125***	0.026	−0.098***	0.026
Under 15	−0.025	0.360	0.125	0.348	−0.096	0.191	−0.043	0.183	−0.210	0.193	−0.110	0.177
Over 65	1.285***	0.453	1.720***	0.461	0.610**	0.240	0.709***	0.242	−0.046	0.242	0.073	0.234
Left	0.043*	0.023	0.039*	0.022	0.023*	0.012	0.020*	0.011	0.019	0.012	0.017	0.011
Center	0.072***	0.025	0.074***	0.024	0.046***	0.013	0.045***	0.013	0.023*	0.013	0.021*	0.012
R^2_{adj}	0.638		0.664		0.565		0.616		0.494		0.555	
Number of countries	18		18		18		18		18		18	
Number of observations	106		98		106		98		106		98	

Note: A constant term and period fixed effects are included in all specifications (not reported). The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

ernment expenditures and transfers, respectively. A 1-standard-deviation increase in expenditure decentralization (13 percentage points) increases total government expenditures and government consumption by around 3 and 2 percentage points, respectively.

Previous research has found a negative relationship between a simple dummy for federalism and welfare spending. This finding is confirmed in table 2. Federal countries seem to spend less on both transfers and government consumption. It is interesting to note that the effects of the decentralization indicators and the federation dummy seem to be quite independent of each other. The effects of tax revenue decentralization and expenditure decentralization are basically unaltered if *Federation* is excluded from the regressions, although the statistical significance decreases somewhat for total government spending and government consumption.[18]

Cross-country evidence has a number of shortcomings. As discussed above, it may be problematic to base inference on variation between countries if cross-section heterogeneity is large. If there are some inherent features of different countries that affect government spending and that are not accurately captured by any of the included regressors, then the correct approach is to include a full set of country dummies. Garrett and Mitchell (2001) criticize the standard approach in welfare-state research and argue that leaving out country FE is likely to lead to substantial bias in the results. In the following I report different specifications that take into account country FE. These are reported in table 3.

The main results from the OLS analysis are reproduced when country-specific FE are controlled for. Tax revenue decentralization is associated with less transfers (but now only statistically significant at the 10% level), and expenditure decentralization is associated with increased government consumption. There is evidence (on the 10% level of significance) that overall government spending increases with increasing decentralization of spending powers.

Inference in the FE estimations is based on countries that have altered their vertical government structure over time. This means that decentralization trends observed in particular for Belgium, France, and Spain contribute considerably to identifying the effect of tax revenue decentralization on government spending. But also other countries that have changed their vertical government structure between 1970 and 2000 contribute to identifying the main coefficients of interest.

Among the countries in the sample, the traditional federal countries stand out. They have had very stable vertical government structures in the period that I study. Consequently one may argue that they should not be included

18 The raw correlation between *TaxRevDec* (*ExpDec*) and *Federation* is 0.34 (0.47).

Table 3

Fiscal Decentralization and Government Spending, Fixed Effects Estimates

	Government Size				Transfers				Government Consumption			
	(7)		(8)		(9)		(10)		(11)		(12)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
TaxRevDec	0.073	0.095	0.006	0.104	−0.084	0.063	−0.128*	0.068	0.108***	0.035	0.058	0.035
ExpDec			0.289*	0.172			0.054	0.112			0.197***	0.058
Unemployment	0.638***	0.174	0.515***	0.190	0.389***	0.115	0.376***	0.124	0.222***	0.064	0.191***	0.064
GDP_95us	−3.296*	1.895	−5.773*	3.061	−1.936	1.247	−2.263	1.991	0.583	0.696	1.127	1.034
Growth	−0.980***	0.347	−1.051***	0.388	−0.203	0.228	−0.458*	0.253	−0.234**	0.127	−0.373***	0.131
Openness	−0.083	0.055	−0.100	0.060	−0.005	0.036	−0.009	0.039	−0.054***	0.020	−0.035*	0.020
Population	−0.627*	0.336	−1.206**	0.494	−0.205	0.221	−0.467	0.321	−0.387***	0.123	−0.379**	0.167
$(Population)^2$	0.001*	0.001	0.002**	0.001	0.000	0.000	0.001	0.001	0.001***	0.000	0.001*	0.000
Rural population	0.095	0.153	0.242	0.178	0.086	0.101	0.237**	0.116	−0.195***	0.056	−0.131**	0.060
Under 15	0.272	0.352	0.456	0.497	0.560**	0.232	0.478	0.323	−0.088	0.129	0.250	0.168
Over 65	1.620***	0.551	1.443**	0.668	0.843**	0.362	0.941**	0.435	0.277	0.202	0.422*	0.226
Left	−0.001	0.013	−0.007	0.014	−0.004	0.008	−0.004	0.009	0.002	0.005	−0.002	0.005
Center	0.004	0.018	−0.001	0.019	0.009	0.012	0.009	0.012	−0.003	0.007	−0.002	0.006
R^2_{adj}	0.941		0.941		0.891		0.898		0.961		0.966	
Number of countries	18		18		18		18		18		18	
Number of observations	106		98		106		98		106		98	

Note: A consant term and period and country fixed effects are included in all specifications (not reported). The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

in the FE estimation, where inference is based purely on within-country variation. An argument for doing so nonetheless is that they help to identify other effects and consequently yield more precise estimates also of the decentralization variables. As a robustness check I analyze how my results are affected by excluding the traditional federal countries. This is reported in table 4. I find that the main results are confirmed when the countries with the least variation in the central independent variables are excluded. Expenditure decentralization is associated with increased government consumption and a larger public sector. But no statistically significant effect of tax revenue decentralization on social security transfers can be found in this sample.

The control variables reported in table 3 show more or less the expected pattern. The macroeconomic variables – unemployment, income, and economic growth – are important. Increases in unemployment and in the share of people over 65 are associated with a larger public sector, and in particular transfer spending. *Unemployment* and *Over 65* capture both automatic entitlement pressures and political demands. Economic growth is negatively associated with public-sector size which, suggests a countercyclical pattern. Relying on within-country variation, no support for Wagner's law, which states that the demand for government services is income-elastic, is found. In fact, GDP per capita enters with a negative sign in specification (8), which is significant at the 10% level. *Rural population* is negatively associated with government consumption and positively associated with transfer spending, both associations being statistically significant.[19]

On theoretical grounds it is not clear how increased integration into the world economy should affect welfare spending. On the one hand, economic integration is likely to create competition for cross-country mobile factors in a similar fashion to interjurisdictional competition within a country. Hans-Werner Sinn, among others, has been concerned about this development in the European welfare states (see for example Sinn, 2003). However, it can also be argued that government spending is expected to increase if governments expand the welfare state to provide a cushion against external risks (Rodrik, 1997, 1998). Relying on cross-country inference, a positive relationship is observed, and the effect on total government spending is driven by increases in transfers, which seems reasonable if government expenditures play a risk-mitigating role (Rodrik, 1998). When country FE are included, such a positive relationship is no longer observed. In fact, openness seems to depress government consumption according to specifications (11) and (12). Finally, there is some evidence based on cross-country regressions that left

19 Settlement pattern is a standard control variable in studies focusing on the size of government and was also included in Oates's seminal study (Oates, 1985). It is not clear how the effect of settlement pattern should be interpreted.

Table 4

Fiscal Decentralization and Government Spending, Traditional Federal Countries Excluded, Fixed Effects Estimates

	Government Size				Transfers				Government Consumption			
	(13)		(14)		(15)		(16)		(17)		(18)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
TaxRevDec	0.139	0.125	0.059	0.147	−0.023	0.075	−0.067	0.078	0.117***	0.043	0.049	0.042
ExpDec			0.294*	0.267			0.047	0.142			0.203**	0.075
R^2_{adj}	0.929		0.924		0.893		0.911		0.965		0.973	
Number of countries	12		12		12		12		12		12	
Number of observations	70		63		70		63		70		63	

Note: A constant term, period and country fixed effects, and control variables as used in previous estimations are included in all specifications (not reported). The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

and center governments are associated with a larger public sector, but this effect also vanishes if country FE are included.

6. Sensitivity Analysis

One of the most interesting findings in the current analysis is that fiscal decentralization seems to be associated with less transfer spending and potentially less generous welfare states. To investigate how robust this result is, I carry out two sensitivity analyses concerning the applied measure of welfare generosity (*Transfers*), before I move on (in section 7) to discussing how the results should be interpreted. First, I evaluate whether the negative effect of fiscal decentralization on transfer spending holds when old-age pensions, which hardly can be decentralized to the regional level, are excluded. Second, I apply net replacement rates as an alternative proxy for welfare generosity.

6.1. Nonpension Social Security Expenditures

An important component of *Transfers* is old age pensions, which hardly can be decentralized to the regional level. Studying the effect of decentralization on transfer spending, there is a rationale for excluding old age pensions. Since there exists no data going back to the 1970s within which one can distinguish between different forms of transfer spending, this has not been done in the above presented analysis. However, in the OECD's social expenditure database it is possible to distinguish between different forms of transfer spending from 1980 onwards.[20] A potentially problematic aspect with this data is that it also includes mandatory private social security expenditures. Keeping this and the reduced time variation in mind, it can nonetheless be interesting to evaluate whether the association between fiscal decentralization and transfer spending holds with this alternative measure.

Additional regressions are run where I replace the measure *Transfers*, documented above, with OECD's aggregate social expenditure measure excluding old age, disability, and survivor benefits. Those benefits constitute on average close to half of total social expenditures. Regressions with nonpension social expenditures as dependent variable are reported in table 5. A somewhat puzzling positive and statistically significant effect of expenditure decentralization is found, relying on pooled OLS estimates. This coefficient flips around in the more reliable FE estimates, suggesting a negative

20 The Social Expenditure Database distinguishes between old age, survivors, and incapacity-related benefits, health, family, active labor-market programs, unemployment, housing, and other social policy areas.

Table 5

Fiscal Decentralization and Nonpension Social Security Expenditures, Ordinary Least Squares and Fixed Effects Estimates

	Social Expenditures Excluding Old Age, Disability, and Survivors Benefits							
	(19)		(20)		(21)		(22)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
TaxRevDec	0.005	0.027	−0.006	0.026	0.043	0.062	0.034	0.063
ExpDec			0.103**	0.039			−0.245*	0.130
Federation	−3.427***	0.675	−4.143***	0.666				
Unemployment	0.278***	0.091	0.270***	0.084	0.244**	0.107	0.234*	0.118
GDP_95us	0.883	0.602	0.599	0.640	−1.266	1.256	2.456	1.948
Growth	−0.179	0.255	−0.470*	0.260	−0.076	0.184	−0.116	0.199
Openness	0.017	0.015	0.041**	0.016	−0.021	0.038	−0.067	0.046
Population	−0.038*	0.020	0.006	0.022	−0.043	0.378	−0.155	0.417
$(Population)^2$	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Rural population	−0.110***	0.024	−0.071***	0.024	−0.186*	0.096	−0.147	0.142
Under 15	−0.107	0.186	−0.093	0.170	−0.205	0.283	−0.570	0.380
Over 65	0.088	0.243	0.097	0.239	−0.253	0.464	0.495	0.569
Left	0.014	0.010	0.016*	0.009	−0.004	0.007	−0.001	0.007
Center	0.032**	0.013	0.022*	0.012	−0.004	0.013	−0.002	0.013
R^2_{adj}	0.649		0.767		0.912		0.902	
Country fixed effects	No		No		Yes		Yes	
Number of countries	18		17		18		17	
Number of observations	69		63		69		63	

Note: A constant term is included in all specifications (not reported). The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

effect of expenditure decentralization and no effect of tax revenue decentralization. The same pattern is found when I utilize the aggregate measure of social expenditures (including all benefits).[21] This is quite different from the results presented in table 3, where I found a negative effect of tax revenue decentralization and no effect of expenditure decentralization. Relying on *Transfers* as defined in section 5, confining the sample to the period after 1980, and reanalyzing models (9) and (10), I find similar (but not statistically significant) results to those in table 3 (not reported). Although the reduced time variation makes it harder to obtain the "true" effect of fiscal decentralization on transfer spending, these regressions provide suggestive evidence that the negative effect of decentralization of taxing powers is partially due to reduced pension spending. All estimates based on FE estimations suggest

21 This measure is similar, but not identical, to *Transfers*. The raw correlation between these two measures ranges from around 0.8 to 0.9 for different years.

that there is a negative association between fiscal decentralization and transfer spending, but which aspect of fiscal decentralization matters depends on the dependent variable chosen.

6.2. An Alternative Measure of Welfare Generosity

To isolate the effect of decentralization on redistribution it would be useful to have some measure of the welfare entitlements of a standardized household across countries. This is the strategy followed by Fiva and Rattsø (2006), studying welfare competition among Norwegian local governments. An equivalent reliable measure suitable for cross-country evaluations is hard to obtain. As an approximation I introduce *benefit replacement rates* as an alternative measure of welfare generosity. If fiscal decentralization is actually associated with less generous welfare states, then this alternative measure should produce similar results to the above.

Since my emphasis is on redistributive spending that can readily be decentralized, I evaluate the OECD's measure of net replacement rates for long-term benefit recipients. These replacement rates show the proportion of in-work income that is maintained for somebody unemployed for the 60th month, net of taxes. The measure includes unemployment insurance and related welfare benefits (e.g., social assistance, family benefits, housing benefits, employment-conditional benefits, and lone-parent benefits).[22]

The replacement rates are calculated as an unweighted average of four different household groups and two alternative earnings possibilities. This measure is close to (unconditionally) unrelated to the measure of fiscal decentralization and varies from 28% in the U.S. to around 75% for Austria, Denmark, Finland, Germany, the Netherlands, Sweden, and Switzerland. The raw correlations with transfers and with nonpension social expenditures are 0.45 and 0.55, respectively. Clearly, since redistributive spending varies within decentralized countries, the OECD measure of replacement rates must be interpreted as a national average.

To my knowledge there is no reliable longer time series available for net replacement rates across countries for long-term unemployed. Thus, this leaves me with a cross section of 18 observations for 2001. In table 6 I present results where the most reliable measure of fiscal decentralization is related to the net replacement rate, utilizing the same controls as in the previous analysis. Interestingly, countries that have more decentralized responsibility for financing of the public sector have lower replacement rates, but the effect is statistically insignificant. With only 18 observations, however, it is hard to test the effect of several different variables. Consequently I exclude one

22 The data is collected from OECD (2004), table 3.2a.

Table 6

Fiscal Decentralization and Net Replacement Rates, Ordinary Least Squares Estimates

	Net Replacement Rates After 60 Months of Unemployment									
	(23)		(24)		(25)		(26)		(27)	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
TaxRevDec	−0.200	0.160	−0.268**	0.107	−0.263**	0.106	−0.357***	0.138		
ExpDec							0.233	0.204	−0.094	0.196
Federation	0.157	7.424								
Unemployment	0.666	0.954	0.812	0.590						
GDP_95us	12.937***	3.918	13.984***	2.737	11.392***	2.012	10.362***	2.367	9.366***	2.839
Growth	0.874	3.753								
Openness	0.051	0.109								
Population	−0.065	0.048	−0.092***	0.027	−0.110***	0.025	−0.115***	0.027	−0.114***	0.033
Rural population	−0.088	0.276								
Under 15	−2.866	2.766	−1.860	1.373						
Over 65	−3.820	3.157	−3.918	2.316						
Left	0.208	0.150	0.232**	0.093	0.102*	0.055	0.146*	0.067	0.113	0.080
Center	−0.057	0.101								
R^2_{adj}	0.655		0.794		0.788		0.790		0.690	
Number of countries	18		18		18		17		17	
Number of observations	18		18		18		17		17	

Note: A constant term is included in all specifications (not reported). The asterisks ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The control variables used are based on a 5-year average for the period 1996–2000.

variable at a time until I am left with variables that are (close to) statistically significant at the 20% level, presented in specification (24), and at the 10% level, presented in specification (25). These more parsimonious specifications show a statistically significant negative association between tax revenue decentralization and net replacement rates. Specifications (26) and (27), where I include both measures of fiscal decentralization and only expenditure decentralization, respectively, show the same pattern: a negative association with decentralization of taxing powers, and no association with decentralization of expenditures.

7. Discussion

The Leviathan theory, elaborated by Brennan and Buchanan (1980), argues that greater centralization can be harmful, because it reduces voters' fiscal location choices, thereby increasing government's monopoly power. With less competition, the government is able to exploit its citizenry more fully and increases the size of the public sector. Following this line of reasoning, it is reasonable to expect a downward pressure on government size from decentralization of taxing powers (for given extent of decentralization of spending powers). Decentralization of spending powers (for given extent of decentralization of taxing powers) is likely to increase the size of government, because this reduces interjurisdictional competition. The regressions related to government size using both measures of fiscal decentralization – specifications (2), (8), and (14) in tables 2–4 – are consistent with this hypothesis, although no effect of tax revenue decentralization can be found in the FE estimations. Closer investigation of the composition of government spending suggests that this pattern is driven by decreased transfer spending due to decentralization of taxing powers and by increased government consumption due to increased decentralization of spending powers. Whether the reduction in transfer is caused by a decrease in nonpension or in pension expenditures, this is suggestive evidence that fiscal decentralization does not act as a powerful instrument to prevent policymakers from wasting resources.

Since transfer spending is negatively related to fiscal decentralization, a possible mechanism discussed by Stigler (1957) and others may be more important than restricting Leviathan. Stigler stressed that decentralized responsibility for redistribution yields incentives for subcentral levels of government to behave strategically in determining taxation and spending levels to influence the location of households.[23] In its extreme version this phe-

23 It may also be that mobility of firms provides incentives for subcentral governments to strategically reduce transfer spending (and increase infrastructure, say) (Keen and Marchand, 1996).

nomenon is known as the *race to the bottom* in taxation and welfare spending. Since social security transfers as a share of GDP are an imperfect proxy for redistributive spending, it is comforting that the alternative measure of welfare generosity, presented in section 6.2, yields the same picture.

8. Conclusion

A large empirical literature has looked for evidence of downward pressure on taxes and expenditures from decentralization of fiscal powers. Until recently most cross-country studies have ignored the distinction between taxes the subcentral government can alter autonomously and taxes it does not have full discretion upon. This paper adds to the empirical literature by utilizing improved data on tax revenue decentralization to reexamine the relationship between fiscal decentralization and the size of government. An important lesson from this paper is that whether revenue generation and expenditures, or just expenditures, are decentralized matters for both the size and the composition of the public sector. Vertical fiscal imbalance, in the sense of more expenditure decentralization for given tax revenue decentralization, is associated with a larger public sector. This effect seems to be driven by increased public consumption. Tax revenue decentralization is on the other hand associated with a smaller public sector, primarily due to less spending on social security transfers. Since transfer spending may work as a proxy for redistributive spending, the results indicate, in line with theory, that fiscal decentralization yields less generous welfare states. Utilizing an alternative measure of welfare generosity, I find the same pattern.

9. Appendix

Table 7

Descriptive Statistics and Documentation

Variable	Definition	Source	Mean	St. dev.	Min	Max
Government size	Total outlays (excluding consumption of fixed capital), consisting of current disbursements plus gross capital formation, acquisitions less disposals of nonproduced nonfinancial assets, and net capital transfers payable less consumption of fixed capital, in percent of GDP. Current disbursements consist of final consumption expenditure, subsidies, property income payable, current taxes on income and wealth payable, social benefits other than social transfers in kind, and other current transfers.	A	43.937	8.886	22.325	64.438
Transfers	Social security transfers as a percentage of GDP. Consists of benefits for sickness, old age, family allowances, etc., social assistance grants, and welfare benefits paid by general government.	A	14.934	4.468	5.600	27.540
Government consumption	Government final consumption expenditure, in percent of GDP, consisting of expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services.	A	20.058	3.926	11.070	29.189
Nonpension social expenditures	Total social expenditures, excluding benefits for old age, survivors, and disability, as a share of GDP. For a complete definition, see OECD's Social Expenditure Database.	B	11.342	3.468	4.085	18.336
Net replacement rates	Net replacement rates are calculated after tax, including unemployment benefits, social assistance, and family and housing benefits in the 60th month of benefit receipt. The rates are calculated as an unweighted average of four different household groups (single person with and without two children, one-earner married couple with and without two children) and two alternative earnings possibilities (67% and 100% of the average production worker's salary).	C	63.31	13.88	27.50	76.75

Table 7
Continued

Variable	Definition	Source	Mean	St. dev.	Min	Max
TaxRevDec	Subcentral government's own tax revenue divided by general government's total tax revenue. Only tax revenue from taxes where the subcentral government can change autonomously the tax rate, tax base, or both are included in the denominator.	D	21.460	16.931	0.278	59.058
ExpDec	Subcentral government expenditure divided by general government expenditure.	E	33.773	13.120	3.463	58.821
Unemployment	Unemployment rates, standardized as far as possible according to OECD criteria.	F	6.768	4.105	0.380	20.900
Left	Cabinet composition: Percent of government from left parties, weighted by days.	F	36.799	33.259	0.000	100.000
Center	Cabinet composition: Percent of government from center parties, weighted by days.	F	25.607	28.369	0.000	100.000
Under 15	Percentage of population 0–14 years of age.	G	21.100	3.392	15.676	31.267
Over 65	Percentage of population 65 years of age and above.	G	13.359	2.254	7.482	17.860
Population	Total population in millions.	G	36.355	57.938	3.054	275.189
Rural population	Percentage of population living in rural areas.	G	27.008	13.088	3.020	71.270
GDP_95us	GDP per capita in 10,000s of 1995 U.S. dollars.	G	2.242	0.774	0.685	4.508
Growth	Growth rate of GDP.	G	2.878	1.394	−0.523	9.790
Openness	Total trade (export + imports), in percent of GDP.	H	56.398	28.428	11.990	165.890

Note: The data are collected from eight different data sources: (A) OECD's Historical Statistics, section 6, (B) OECD's Social Expenditure Database, (C) Benefits and Wages, OECD Indicators (OECD, 2004), (D) Dan Stegarescu's data set (2005), (E) IMF Government Finance Statistics[24], (F) the Comparative Political Data Set (Armingeon et al., 2004), (G) the World Development Indicators, and (H) the Penn World Table Version 6.1 (Heston et al. 2001). Descriptives based on period averages; 98 observations, except for nonpension social expenditure (69 observations) and net replacement rates (18 observations).

[24] Downloadable from: http://www1.worldbank.org/publicsector/decentralization/fiscalindicators.htm

Table 8

Descriptive Statistics for the Main Dependent Variables

Country	Government Size				Transfers				Government Consumption			
	Mean	St. Dev.	Minimum	Maximum	Mean	St. Dev.	Minimum	Maximum	Mean	St. Dev.	Minimum	Maximum
Australia	33.19	3.17	27.31	35.96	7.19	1.44	4.65	8.63	18.34	1.21	16.05	19.54
Austria	48.00	4.06	40.64	51.74	17.65	1.36	15.69	18.91	18.80	1.56	15.85	20.03
Belgium	51.87	5.52	43.26	60.03	16.34	1.91	12.92	18.73	21.46	1.49	19.06	23.60
Canada	42.78	4.60	35.98	49.07	10.61	2.34	7.55	13.76	21.56	1.29	19.47	23.22
Denmark	51.06	5.99	41.10	56.55	16.26	2.92	11.53	19.73	25.51	1.53	22.77	27.49
Finland	43.11	8.62	31.70	56.28	14.52	5.23	7.80	22.20	20.25	2.80	15.95	24.16
France	46.28	4.87	38.23	50.50	17.06	1.14	15.44	18.43	21.98	2.30	17.90	23.70
Germany	45.96	2.15	41.91	47.92	16.66	1.62	14.13	19.05	19.55	0.81	18.08	20.46
Ireland	43.17	7.02	32.80	53.85	12.60	2.40	9.84	15.62	17.74	2.02	14.58	20.50
Japan	30.77	4.68	22.32	36.34	8.91	1.96	5.61	10.92	13.70	1.37	11.55	15.77
Netherlands	53.58	7.10	43.66	61.39	22.47	5.30	13.21	27.78	25.02	1.63	22.88	27.26
Norway	45.89	2.87	43.11	50.22	13.91	1.69	11.99	16.50	19.59	1.48	17.25	21.53
Portugal	37.50	7.77	23.62	44.50	10.29	2.81	4.81	12.80	15.39	2.79	12.76	19.28
Spain	35.70	8.19	22.88	44.77	13.93	2.72	9.46	16.91	15.16	2.92	10.54	18.27
Sweden	57.36	6.94	44.95	64.44	18.05	3.19	12.74	22.38	27.05	1.97	23.54	29.19
Switzerland	30.74	4.03	23.92	35.28	11.88	1.49	9.66	13.38	13.13	1.20	11.07	14.52
United Kingdom	41.72	2.41	38.80	45.49	12.71	2.15	9.32	15.26	20.17	1.14	18.54	21.77
United States	33.45	2.11	30.60	35.76	11.13	1.48	8.93	12.78	16.65	1.15	14.53	17.67

References

Anderson, J. E., and van den Berg, H. (1998), Fiscal Decentralization and Government Size: An International Test for Leviathan Accounting for Unmeasured Economic Activity, International Tax and Public Finance 5, 171–186.

Armingeon, K., Leimgruber, P., Beyler, M., and Menegale, S. (2004), Comparative Political Data Set 1960–2002, Institute of Political Science, University of Bern.

Bardhan, P. (2002), Decentralization of Governance and Development, Journal of Economic Perspectives 16, 185–205.

Brennan, G., and Buchanan J. (1980), The Power to Tax, Cambridge, Cambridge University Press.

Cameron, D. R. (1978), The Expansion of the Public Economy: A Comparative Analysis, American Political Science Review 72, 1243–1261.

Ebel, R., and Yilmaz S. (2003), On the Measurement and Impact of Fiscal Decentralization, in: Martinez-Vazquez, J., and Alm, J. (Eds.), Public Finance in Developing and Transitional Countries, Edward Elgar, Cheltenham, UK, 101–119.

Ehdaie, J. (1994), Fiscal Decentralization and the Size of Government, Policy Research Working Paper No. 1387, World Bank.

Faguet, J.-P. (2004), Does Decentralization Increase Government Responsiveness to Local Needs? Evidence from Bolivia, Journal of Public Economics 88, 867–893.

Feld, L. P., Kirchgässner, G., and Schaltegger, C. A. (2003), Decentralized Taxation and the Size of Government: Evidence from Swiss State and Local Governments, CESifo Working Paper No. 1087.

Fisman, R., and Gatti R. (2002), Decentralization and Corruption: Evidence across Countries, Journal of Public Economics, 325–345.

Fiva, J. H., and Rattsø, J. (2006), Welfare Competition in Norway: Norms and Expenditures, European Journal of Political Economy 22, 202–222.

Garrett, G., and Mitchell, D. (2001), Globalization, Government Spending and Taxation in the OECD, European Journal of Political Research 39, 145–177.

Grossman, P. J. (1989), Fiscal Decentralization and Government Size: An Extension, Public Choice 62, 63–69.

Heston, A., Summers, R., and Aten, B. (2002), Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP).

Huber, E., and Stephens, J. D. (2001), Development and Crisis of the Welfare State, University of Chicago Press, Chicago.

Jin, J., and Zou, H. (2002), How Does Fiscal Decentralization Affect Aggregate, National, and Subnational Government Size?, Journal of Urban Economics 52, 270–293.

Keen, M., and Marchand, M. (1997), Fiscal Competition and the Pattern of Public Spending, Journal of Public Economics 66, 33–53.

Musgrave, R. (1959), The Theory of Public Finance, McGraw-Hill, New York.

Oates, W. E. (1972), Fiscal Federalism, Harcourt, New York.

Oates, W. E. (1985), Searching for Leviathan: An Empirical Study, American Economic Review 75, 748–757.

Oates, W. E. (1989), Searching for Leviathan: A Reply and Some Further Reflections, American Economic Review 79, 578–583.

OECD (1999), Taxing Powers of State and Local Government, OECD Tax Policy Studies 1, Paris.

OECD (2004), Benefits and Wages: OECD Indicators, OECD, Paris.

Riker, W. H. (1964), Federalism: Origin, Operation, Significance, Little Brown, Boston.

Rodden, J. (2003), Reviving Leviathan: Fiscal Federalism and the Growth of Government, International Organization 57, 695–729.

Rodden, J. (2004), Comparative Federalism and Decentralization: On Meaning and Measurement, Comparative Politics 36, 481–500.

Rodrik, D. (1997), Has Globalization Gone too Far?, Institute for International Economics, Washington, DC.

Rodrik, D. (1998), Why Do More Open Economies Have Bigger Government?, Journal of Political Economy, 1998, 997–1032.

Sinn, H.-W. (2003), The New Systems Competition, Blackwell Publishing, Oxford.

Stegarescu, D. (2005), Public Sector Decentralisation: Measurement Concepts and Recent International Trends, Fiscal Studies, 301–333.

Stein, E. (1999), Fiscal Decentralization and Government Size in Latin America, Journal of Applied Economics 2, 357–391.

Stigler, G. J. (1957), The Tenable Range of Functions of Local Government, in: U.S. Congress Joint Economic Committee (Ed.), Federal Expenditure Policy for Economic Growth and Stability, Washington DC, 213–219.

Swank, D. (2002), Global Capital, Political Institutions, and Policy Change in Developed Welfare States, Cambridge University Press, Cambridge, United Kingdom.

Treisman, D. (2002), Defining and Measuring Decentralization: A Global Perspective, unpublished paper. Available at http://www.polisci.ucla.edu/faculty/treisman/.

Wildasin, D. E., (1991), Income Redistribution in a Common Labor Market, American Economic Review 81, 757–774.

Wilson, J. D. (1986), A Theory of Interregional Tax Competition, Journal of Urban Economics 19, 296–315.

Zodrow, G. R., and Mieszkowski, P. M. (1986), Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods, Journal of Urban Economics 19, 356–370.

Jon H. Fiva
Center for Economic Research
Department of Economics
Norwegian University of Science and Technology
7491 Trondheim
Norway
jon.fiva@svt.ntnu.no