Municipal Labour Demand

Sweden 1988 - 1995[‡]

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Abstract

In this paper we investigate the determinants of municipal labour demand in Sweden 1988-1995. Utilising a major grant reform in 1993, through which a switch from mainly targeted to mainly general central government grants occurred, we are able to identify which type of grants that have the largest effects on municipal employment. We find a larger municipal employment elasticity with respect to grants before the reform, implying that the more freedom given to the municipalities, the less they seem inclined to spend on municipal employment. We further find (i) a short run wage elasticity of approximately -0.5 and a long run ditto of approximately -0.9, (ii) a quite sluggish adjustment process: only 60% of the desired change in municipal employment is implemented in the first year, (iii) that the demographic structure is an important determinant of municipal employment, and (iv) that the behavioural pattern is different in "socialist" municipalities.

Keywords: Municipal labour demand, Panel data, Median voter model, Sluggishness.

JEL-classification: H70, J45, C23

1. Introduction

Despite the fact that most local governments in the western world are large employers, there are very few studies investigating the determinants of local government labour demand. This pattern is especially pronounced in Sweden, where the total local government sector[1] accounts for about 30% of total employment in the economy. The corresponding figure for the municipalities is about 20%, and wages and payroll taxes constitute approximately 50% of municipal expenditures. This makes the local governments in Sweden the largest single employer in the economy, but still no studies exist examining the factors governing Swedish local government labour demand.

The purpose of this paper is to investigate the determinants of municipal labour demand in Sweden during 1988 - 1995, a period in which the public sector faced new challenges in terms of diminishing tax bases and shifts in the demographic structure to more young and more retired people. More specifically, we will in this paper (i) Estimate wage elasticities; (ii) Evaluate the effects of switching from specific intergovernmental grants to more general ones, where the municipalities may use grants at their disposal more freely. These effects are possible to identify since a major change in the grant system was made in 1993. The outcome of such an institutional change might well be policy relevant for other countries than Sweden; (iii) Study how demographic and political factors affect municipal labour demand; (iv) Examine whether the adjustment process in Swedish municipalities is sluggish or not. Evidence in Dahlberg & Johansson (1996, 1997) indicates that it might be important to control for dynamics when investigating the behaviour of

[1] The total local government sector in Sweden is made up of the municipalities and the counties. In this paper we will focus our interest on the municipalities, which are responsible for, e.g., schooling, day care, and elderly care.

Swedish local governments. Furthermore, Holtz-Eakin & Rosen (1991) find that dynamics is important in their study on rationality in municipal labour demand in the US.

The few existing studies investigating local government labour demand either estimate demand systems where the total amount of employment is treated as fixed (see, e.g, Ehrenberg (1973)) or evaluate public service employment programs using aggregate time series data (see, e.g, Johnson & Tomola (1977)). For an overview of earlier studies, see Ehrenberg & Schwarz (1986). Holtz-Eakin & Rosen (1991) do not study the determinants of municipal labour demand per se, but rather test rationality, in the sense of Hall (1978), and assume that the local government decision maker maximises an intertemporal utility function. In this paper, we adopt a median voter model where the voters optimise subject to both their individual and their municipality's budget constraints, thereby making the level of municipal employment endogenously determined. Under specific assumptions on the utility function of the median voter and the production function of the municipality, we come up with a closed form solution for a municipal labour demand function which we estimate using panel data methods.

The paper is organised as follows: the theoretical model is set up and described in the next section. Section 3 gives some institutional descriptions on Swedish municipalities together with some characterisations of the data we use. Section 4 presents our empirical findings, whereas the final section summarises and concludes.

2. Theoretical Model

When studying the behaviour of local governments, individual preferences must somehow be translated into a single choice at the municipality level. Since the days of Kenneth Arrow's formulation of the famous Impossibility Theorem, public finance economists have been aware of the fact that aggregating preferences is a tricky business. However, under certain assumptions (e.g. single-peaked preferences, a

single majority voting system and a one-dimensional policy question (a single public service)) these problems can be overcome. It will turn out that, if these assumptions hold, the winning proposal in a majority vote will be the proposal made by the voter with the median position in preferences. This was first stated by Hotelling (1929) and later developed by Bowen (1943) and Black (1958). Even though it can be questioned whether the assumptions underlying the median voter model actually hold, it has become the most common behavioural specification used when modelling the decision making process at the local government level, and we will in this paper follow this tradition and use the median voter model.

Let us investigate the median voter's optimisation problem in municipality $i = 1,\ldots, M$ in time period $t = 1,\ldots, T$. The preferences of the median voter are assumed to be captured by the function

$$U_{it} = U\left(X_{it}, e_{it}\right) \tag{1}$$

where $U(\cdot)$ is a quasi-concave utility function, X_{it} a composite private good (with a price normalised to one), and $e_{it} = E_{it}/N_{it}$ per capita local public provision of a private good. The median voter maximises the utility function subject to two budget constraints; his or her individual budget constraint as well as the municipality's budget constraint. First, the level of private consumption cannot exceed the median voter's disposable income

$$X_{it} = \left(1 - t_{it}\right) y_{it}^{m} \tag{2}$$

where t_{it} is the local tax rate and y_{it}^m the median voter's (before tax) income. Furthermore, maximisation is constrained by the municipality's budget constraint

$$t_{it} N_{it} \bar{y}_{it} + G_{it} = w_{it} N_{it}^d \tag{3}$$

where N_{it} is the number of inhabitants in municipality *i* in period *t*, $\bar{y}_{it}$ the mean individual (before tax) income, G_{it} intergovernmental grants received by the municipality, w_{it} the wage rate received by individuals employed by the municipality, and n_{it}^d municipal employment needed in order to supply e_{it}.[2] Solving (3) for the local tax rate, and substituting into (2) yields

$$X_{it} = y_{it}^m + t_{it}\left(g_{it} - w_{it} n_{it}^d\right) \tag{4}$$

where g_{it} is intergovernmental grants per capita and $t_{it} = \frac{y_{it}^m}{\bar{y}_{it}}$ is the tax price paid by each median voter.[3] The tax-price is to be interpreted as the marginal cost, in terms of increased tax payments, facing the

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[2] Here we abstract from capital inputs and simply assume that the only input needed in the supply of *E* is labour, that is, we assume that the production function takes the form $e_{it} = f\left(n_{it}^d\right)$ in per capita terms. This assumption is perhaps not too unrealistic having the types of services municipalities supply in mind.

[3] There is a literature which claims that people employed by the municipality to a larger extent vote for higher municipal expenditures than people not employed by the municipality (see, e.g., Courant, Gramlich, & Rubinfeld (1979)). In relation to this it might be noted that we assume that the median voter is not employed by the municipality, an assumption which probably is fulfilled.

individuals for an additional unit of the publicly provided good. Substituting (4) and the production function $e_{it} = f\left(n_{it}^{d}\right)$ into (1) yields the following maximisation problem

$$\max_{n^d} \; U = U\left[y_{it}^{m} + t_{it}\left(g_{it} - w_{it} n_{it}^{d}\right),\, f\left(n_{it}^{d}\right)\right] \tag{5}$$

In order to fix ideas for the empirical part of the paper and to get a labour demand function that can be easily implemented in an econometric model, we assume that the production function takes the simple form $e_{it} = a n_{it}^{d}$ and that the utility function takes the form

$$\max_{n^d} \; U = exp\left\{-\left(1 + \frac{b\left(y_{it}^{m} - t_{it}\left(w_{it} n_{it}^{d} - g_{it}\right) + s_{it}\right)}{b + a n_{it}^{d}}\right)\right\}\left(\frac{b}{-b - a n_{it}^{d}}\right) \tag{6}$$

where $b = a\frac{a}{b}$, $s_{it} = \frac{z_{it}}{b} + \frac{a}{b^2}$, and $z = d_0 + d_1 z_1 + d_2 z_2 + d_3 z_3 + \ldots$ is a vector of socio-economic characteristics. This form of the utility function has been used and discussed by, for example, Hausman (1980) and Blomquist (1983).

Solving the maximisation problem in (6) yields the following municipal labour demand function

$$n_{it}^{d*} = z_{it} + b\left(y_{it}^{m} + g_{it} t_{it}\right) + a\, w_{it} t_{it} \tag{7}$$

which will form the basis for our empirical investigation of the static model in Section 4.

However, since it is not likely that municipalities may adjust labour freely, we would expect actual employment to deviate from the one optimal in a static framework. Earlier studies in the literature on local public expenditures indicate some kind of dynamic behaviour of local governments (see, e.g., Holtz-Eakin & Rosen (1991) on U.S. data, Dahlberg & Johansson (1996, 1997) on Swedish data, and Borge & Rattsø (1993, 1996) and Borge, Rattsø & Sørensen (1996) on Norwegian data). We will therefore introduce dynamics by combining the static median voter model with a partial adjustment rule. The dynamic formulation separates the desired amount of employment $\left(n_{it}^{d*}\right)$ from actual employment $\left(n_{it}^{d}\right)$ for each year. The desired level of employment is determined by equation (7), whereas the relationship between the desired and the actual level of employment is formulated as a partial adjustment process. The actual change between periods t and $t-1$ is a fraction, l, of the desired change

$$n_{it}^{d} - n_{it-1}^{d} = l\left(n_{it}^{d*} - n_{it-1}^{d}\right) \tag{8}$$

The adjustment coefficient l hence measures the sluggishness of local government responses to changing desired demand: the smaller the value of l, the stronger the sluggishness.

Substituting (7) into (8) yields

$$n_{it}^{d} = l\left[z_{it} + b\left(y_{it}^{m} + g_{it}t_{it}\right) + a\,w_{it}t_{it}\right] + (1-l)n_{it-1}^{d}. \tag{9}$$

Finally, if we define $m_j = ld_j$, $j = 0, 1, 2, \ldots$, $f = lb$, and $j = lc$, we can rewrite (9) as

$$n_{it}^{d} = z_{it} + f\left(y_{it}^{m} + g_{it}\,t_{it}\right) + j\,w_{it}\,t_{it} + (1-l)n_{it-1}^{d}, \qquad (10)$$

where $z = m_0 + m_1 z_1 + m_2 z_2 + m_3 z_3 + \ldots$. Equation (10) will form the basis for our empirical analysis of the dynamic model in section 4. We will also need expressions for different elasticities in order to readily assess the magnitude of different effects. The short run effects can be shown to be[4]

Income elasticity[5]: $h_{y_{it}^{m}} = \dfrac{y_{it}^{m}}{n_{it}^{d}}\, f$

Wage elasticity: $h_{w_{it}} = \dfrac{w_{it}}{n_{it}^{d}}\, j\ t_{it}$.

Grant elasticity: $h_{g_{it}} = \dfrac{g_{it}}{n_{it}^{d}}\, f\, t_{it}$.

When confronting the model with data, we will follow earlier studies and characterise the median voter as the voter with median income (see Theorem 2 in Bergstrom & Goodman (1973)).

In the public finance literature, there is a discussion about an anomaly named the "flypaper effect", referring to the tendency for money to get stuck where it hit. According to economic theory, it should make no

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[4] The long run elasticities are obtained by dividing the short run elasticities with l. The expressions for the elasticities in the static model are the same, however substituting b for $f$and a for j.

[5] Derivation of (10) with respect to y_{it}^{m} and taking the effect on t into account yields a more complicated expression than above. These elasticities are not reported in the paper but are available upon request. The income elasticity reported is the one standard in the literature.

difference whether money is collected through taxes or through general grants; an increase in one of them should yield the same increase in public consumption as an increase in the other. However, studies investigating the demand for local public services by means of the median voter model have found that an increase in general grants has significantly different effects on spending than an increase in (median) income, which is taken as an indication of such a flypaper effect. However, given that the intergovernmental grants are targeted rather than general, it is no longer obvious, even theoretically, that they will have the same effect on public consumption as income. We will in the empirical part investigate whether grants and income have the same effect on labour demand.[6]

In the same line as above, one could argue that the form in which intergovernmental grants come probably matters for their effects on public spending. In 1993 there was a major reform that changed the system of intergovernmental grants from mainly specific to mainly general ones. This gives us an opportunity to investigate whether specific grants have had a different effect on local public employment than general ones.

3. Data and some Stylised Facts

The data set is obtained from Statistics Sweden[7] and covers 245 Swedish municipalities during the period 1988 - 1995. In 1995 there were 288 municipalities in Sweden, out of which 284 existed in 1988. 36 of these were deleted from our data set, because of missing values for some of the

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[6] For a recent overview of the flypaper literature and a discussion of possible explanations for the flypaper effect, see Bailey & Connolly (1998).

[7] More specifically, the sources are "Yearbook for the Swedish Municipalities", "Financial Statements for Swedish Municipalities" and "LINDA", a large Longitudinal INdividual DAtabase at the Department of Economics, Uppsala university. For a more detailed description of our data set, see Appendix A.

variables of interest. Finally, three municipalities (Gotland, Malmö and Göteborg) were excluded because they handle activities normally handled by the county councils. Altogether, this leaves us with a balanced panel of 245 municipalities over 8 years. The dependent variable in our theoretically derived model is the number of employed[8] in municipalities, and the key regressors are INCOME, which is equal to real median income plus real intergovernmental grants from the central government times the tax price (median income over mean income), and PRICE, which is defined as average real wage in the local public sector times the tax price. These variables enter in per capita figures, in accordance with the theoretical model.

Table 1.

Time varying means and standard deviations of the key variables.

YEAR	MUNICPAL EMPL.		INCOME		PRICE	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1988	0.056	0.0065	128583	12809	112174.	6255
1989	0.056	0.0064	135297	13675	116967	6064
1990	0.060	0.0066	135167	14229	114349	6851
1991	0.059	0.0066	123838	11984	108963	7637
1992	0.066	0.0081	124795	10401	114998	7138
1993	0.064	0.0083	122694	10408.	107459	7046
1994	0.065	0.0089	121587	10510.	107448	7648
1995	0.066	0.0094	122859	10130	111186	7208
Total	0.061	0.0086	126852	12945	111693	7750

Notes: Municipal employment is expressed as number of employees per inhabitant in each municipality. The income and price variables are expressed in 1988 SEK.

Table 1 displays the time varying means and standard deviations of the key variables. Looking briefly at these, they all seem coherent with a few

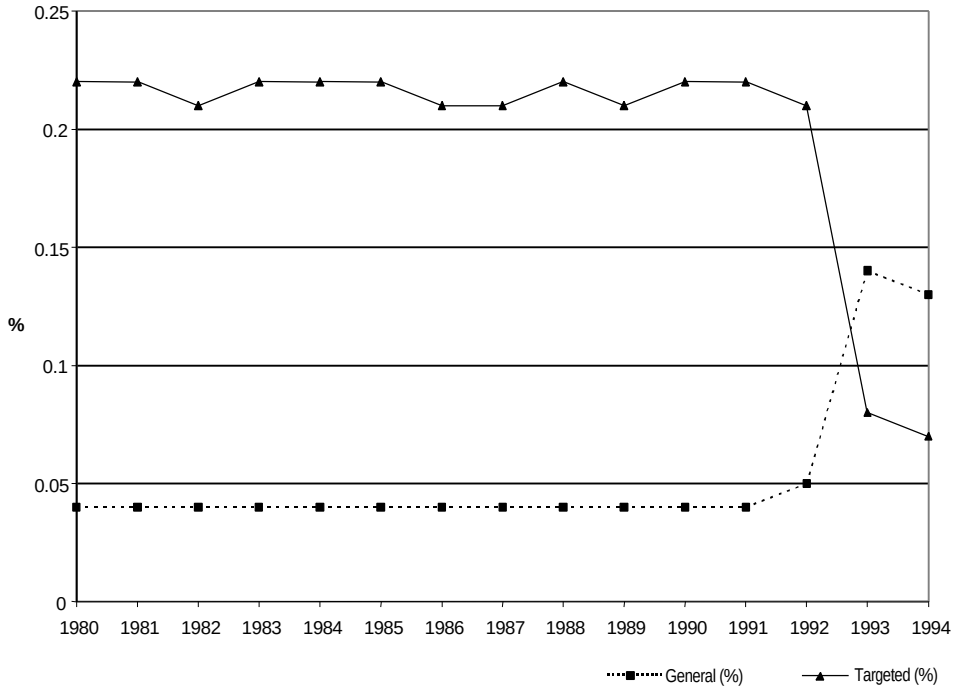
[8] Employed in terms of full time equivalents.

stylised facts on municipal employment in Sweden. Whereas incomes have dropped slightly, and prices have by and large remained unaltered, municipal employment as expressed in the number of employees per capita, has increased over the period. The main cause for this increase is the reform in 1992 when municipalities overtook the responsibility for care for the elderly (ÄDEL-reformen).

In order to examine our key variables under the studied period a bit more closely, we have estimated the covariances and correlations of first differences of the logs of these variables. The results can be found in Appendix B. The purpose of using first differences rather than levels is to eliminate fixed effects, which we assume to be present in the data. Looking at the covariances for employment in Table B1, we can see that the between-variance increases drastically between the years 1991 and 1992, but then returns to its former level almost immediately. This period coincides with the care-for-the-elderly reform. Comparing the results in Table B1 to those in Table 1, where we have not accounted for fixed effects when computing the standard deviations, it appears that the effects of the reforms appear more idiosyncratic when heterogeneity is taken into consideration.

Looking at the important policy variable real grants in Table B4, there is a drastic increase in the between municipalities variance during the second half of the period, a period which coincides with the switch from targeted to more general grants from the central government to the municipalities, as shown in Figure 1.

Figure 1. General and targeted grants received by the municipalities as a share of total municipal revenues



Source: "Financial Accounts for the Municipalities" (Kommunernas Finanser)

There are two main implications for the empirical part from having looked at these descriptive statistics. First, we need to take heterogeneity into consideration, and, secondly, we must somehow capture the idiosyncratic effects from the care-for-the-elderly reform. The former consideration is taken into account by adopting a fixed effect approach in our regressions. Thinking about the latter, it seems plausible that the age structure of each municipality would be an important explanatory factor if we want to control for how the reform has affected the municipalities' demand for labour. If there were a large fraction of elderly, we would expect the effects of reform to be relatively pronounced. Apart from including time-dummies to take care of common shocks, we will hence

also throughout include variables capturing the age structure in order to control for potentially idiosyncratic effects from reform.

In addition to the median voter's income, it is possible that his/her political preferences also influence the desired level of public consumption. We will therefore use a dummy variable, (SOC) indicating if the municipality is lead by a socialist or a conservative local government, as a proxy for the median voter's political preferences.[9] Our hypothesis is that "Socialists" demand more public consumption, and thus demand more labour, than do "conservatives".[10] Another reason for employment to differ between socialist and conservative municipalities, might be that "socialists" probably are more restrictive than conservatives when it comes to privatising public services handled by municipalities.

[9] Furthermore, in the analysis of the dynamic model we will also estimate on sub-samples, as for example "socialist municipalities" and "conservative municipalities", to allow them to be heterogeneous in the slope coefficients as well as in the intercept. See section 4 for a more detailed discussion.

[10] Some people have argued that by including SOC as a regressor in a median voter model, two different theoretical models are mixed and that this implies that the median voter model is not valid. We have problems in understanding this argument since we consider SOC as a proxy for the median voter's ideological preferences. However, one way to test if the inclusion of SOC as a regressor is "important" (in the sense that the qualitative results are altered) or not, is to reestimate without SOC as a regressor. It turns out that almost nothing happens if we disregard from SOC in the estimation. The point estimates, the t-ratios as well as the elasticities change very little. The qualitative conclusions are unaffected. All estimations reported in the paper have had SOC as a regressor. The estimates with SOC excluded are available on request.

4. Empirical Results

4.1 Static model

Starting with the static model, we extend equation (7) and estimate the following fixed effect model

$$n_{it}^{d} = \iota_t + z_{it} + \beta\left(y_{it}^{m} + \gamma_{it} t_{it}\right) + \alpha w_{it} t_{it} + \phi_i + \varepsilon_{it}, \qquad (11)$$

where

$$z_{it} = \delta_0 + \delta_1 * YOUNG_{it} + \delta_2 * YOUNG_{it-1} + \delta_3 * OLD\_91_{it} + \delta_4 * OLD92\_{it} + \delta_5 * SOC_{it}$$

ϕ_i is a municipality specific fixed effect, ι_t is a time dummy and ε_{it} is a white noise error term.[11] To remove the fixed effect, we have two different alternatives: either taking first differences, and use an instrumental variables approach, described below in more detail, or else, removing the fixed effect by transforming all variables to deviations from their means and estimating by OLS; the so called within-estimator. The latter approach would require strictexogeneity, an assumption that is testable by means of a Hausman-test. Performing such a test with the first difference instrumental variables estimator as the alternative, clearly

[11] For an explanation of the socio-economic variables, see Appendix A. The inclusion of the lagged value for YOUNG might seem somewhat odd, but is mainly motivated by our empirical finding that the lag turned out to be significant in more cases than the contemporaneous observation. See also the discussion on the specification test of the dynamic model. Since we wished to keep the z - regressors constant over different specifications, we have choosen to include the lag even initially. The main reason for the lag being significant is probably the "baby-boom" which took place during the period we are investigating. Since most children spend their first year at home with their parents, the baby boom will cause the share of young people to increase before the demand for labour in municipal day-care does.

rejects the null of strict exogeneity. (The test statistic, which is chi-squared under a true null, takes on a value of 242.52 with 12 degrees of freedom.)[12] Since we conclude that the within-estimator is not possible to use in this context, we will rely on the first differenceGMM estimation technique suggested by Holtz-Eakin, Newey & Rosen (1988) and Arellano & Bond (1991).[13] Taking first differences will induce a first-order MA-process into the transformed residuals, and since we have potentially endogenous variables on the right hand side, we must rely on instrumental variable techniques to get consistent estimates. As instruments we may use values of the dependent variable lagged two periods back and more, which implies that the number of instruments grows with *t*. These instruments will be valid as long as there is no serial correlation of higher order than one. Since we have anoveridentified model in the sense that we have more instruments than parameters to estimate, the validity of the instruments can be tested by means of the Sargan-test for overidentifying restrictions and the tests for autoregressive structures in the residuals presented byArellano & Bond (1991). The estimations are performed in two steps, where, in order to control for heteroscedasticity, residuals from the first step (GMM1) are used in the weighting matrix in the second step (GMM2).[14] The first difference estimates are presented in Table 2. Looking at the specification and trying to choose proper instruments by means of theSargan and AR(1)-AR(4) tests, there is no indication of misspecification when

[12]The first-difference instrumental variables estimates are given in Table 2. The (inconsistent) within-estimates are available upon request. We have also conducted Hausman tests for the validity of a random effects model, and rejected that specification with both the within specification as well as the first difference one as alternatives.

[13] The only difference between the estimators proposed in these two papers is the weighting matrix used in the first step. We will use the weighting matrix proposed by Arellano & Bond (1991).

[14] For explicit formulas for the GMM estimator and the test-statistics, see, e.g., Arellano & Bond (1991).

"OLD" and "PRICE" are treated as endogenous. Treating "OLD" and/or "PRICE" as exogenous, however yields quite bad specification results. Conducting difference Sargan-tests on "OLD" and "PRICE" along the lines of Arellano & Bond (1991), testing the null hypothesis that they are exogenous, the null is rejected. Since the model specification in GMM1 is rejected by means of the Sargan statistic for most specifications presented below, we have an indication thatheteroscedasticity might be prevalent. Using these results as guidelines for the choice of instruments, we get the estimates included in Table 2 for the static model.

Table 2. Static employment model (eq. 11).

	GMM1			GMM2		
Variable	**Coeff**	**SE**	**t-ratio**	**Coeff**	**SE**	**t-ratio**
INCOME	0.2517	0.0533	4.7185	0.2374	0.0277	8.5610
PRICE	-0.6122	0.0956	-6.4042	-0.4811	0.0578	-8.3196
YOUNG	-0.2353	0.1879	-1.2521	-0.3030	0.1346	-0.2251
YOUNG(-1)	0.3434	0.1846	1.8600	0.1860	0.1317	1.4122
OLD _91	-0.1071	1.3102	-0.0817	-0.1885	0.7461	-0.2526
OLD 92_	2.4468	1.3594	1.8000	1.9479	0.7283	2.6747
SOC	0.3922	0.6604	0.5939	0.5517	0.4453	1.2390
	Sargan(1)	Sargan(2)	AR(1)	AR(2)	AR(3)	AR(4)
Test			-3.9786	-0.8781	-1.2312	-0.4090
p-value	0.000	0.091	0.000	0.190	0.109	0.341

Notes

i) GMM estimates obtained using DPD for Ox 1.20. For a description of the programs, see Doornik (1996) and Arellano et al. (1997)

ii) Standard errors are computed using the asymptotic standard errors, which are obtained using a heteroscedasticity-robust estimator of the variance-covariance matrix.

iii) The AR(1) - AR(4) tests are reported as the test statistics for first- through fourth order serial correlation in the residuals in first differences in the GMM2 estimation. These statistics are each supposed to be asymptotically standard normal under the null of no serial correlation.

iv) A constant and time dummies are included in all regressions.

v) Sargan(1) (Sargan(2)) gives the p-value of the Sargan test of the over-identifying restrictions (validity of instruments) in the GMM1 (GMM2) estimation. Under the null of valid instruments, the Sargan statistic is asymptotically distributed as chi-squared with (p-k) degrees of freedom, where p is the number of moment conditions and k is the number of coefficients estimated.

vi) The set of instruments includes INCOME, YOUNG, YOUNG(-1) and SOC in first differences, EMPLOYMENT, PRICE and OLD in levels all available observations with lagged 2 years and more, as well as the constant and the time dummies.

vii) To improve readability, the estimates for INCOME and PRICE have been multiplied by a factor of 10^6 whereas the estimates for YOUNG, OLD and SOC have been rescaled by a factor of 10^3 for the same reason.

We can first note that both the price and the income variables enter significantly and with their expected signs. Investigating the sizes of the different effects by calculating elasticities, we find that the wage elasticity equals -0.947 with an estimated standard error of 0.113, implying that this elasticity is not significantly different from minus one. The income elasticity is 0.518 (Std. Err 0.06) whereas the grant elasticity is small, yet significant (0.02, Std.err 0.002). Looking finally at the variables in z, we find that the share of inhabitants over 80 years (OLD), the share most likely to need elderly care, enters negatively, yet insignificant, before the elderly reform in 1992, when the responsibility for elderly care was transferred from the county level to the municipal level, and significantly positive after the reform. Somewhat surprising is the result that the share of inhabitants younger than 16 years of age does not seem to affect the level of employment, nor does this variable lagged one period. The political variable is positive, which is in line with our prior expectation, but not significantly different from zero.

4.2 Dynamic model

In the light of earlier findings in the literature of dynamic behaviour of local governments, we would like to examine if allowing for dynamics could affect the results, before investigating other extensions of the model. The dynamic specification uses equation (10) as a starting point. In addition to an additive error term e_{it}, we will, once again, allow for individual, municipality-specific fixed effects, f_i, and the equation to be estimated is hence given by

$$n_{it}^{d} = i + z_{it} + f\left(y_{it}^{m} + g_{it} t_{it}\right) + j\, w_{it} t_{it} + (1 - l) n_{it-1}^{d} + f_i + e_{it} \quad (12)$$

where z is defined as in the previous section.

Table 3. Model 1: Basic dynamic employment model (eq. 12).

	GMM1			GMM2		
Variable	**Coeff**	**SE**	**t-ratio**	**Coeff**	**SE**	**t-ratio**
EMPL(-1)	0.3560	0.0560	6.3559	0.2965	0.0441	6.7221
INCOME	0.1643	0.0411	3.9966	0.1625	0.0275	5.9160
PRICE	-0.3981	0.0804	-4.9124	-0.3917	0.0589	-6.6543
YOUNG	-0.1447	0.1407	-1.0287	-0.0841	0.1237	-0.6800
YOUNG(-1)	0.3185	0.1330	2.3949	0.2969	0.1134	2.6175
OLD _91	2.3697	1.4084	1.6825	2.3642	1.0299	2.2957
OLD 92_	4.2866	1.4278	3.0023	4.1291	1.0450	3.9511
SOC	0.2856	0.5021	0.5688	0.4904	0.3967	1.2364
	Sargan(1)	Sargan(2)	AR(1)	AR(2)	AR(3)	AR(4)
Test			-4.4268	-0.7573	-1.0965	-0.4720
p-value	0.000	0.391	0.000	0.224	0.136	0.318

Notes:

i) The set of instruments includes INCOME, YOUNG, YOUNG(-1) and SOC in first differences, PRICE and OLD in levels lagged 2 and more years, EMPLOYMENT in levels lagged 3 and more years, as well as the constant and time dummies.

ii) See further notes for Table 2.

Estimating the basic model in equation (12), we get the results given in Table 3[15]. Once again we cannot reject the model-specification in the GMM2 column: neither the Sargan-statistic, nor theAR(1)-AR(4) tests reject the specification. Comparing with the static model, the p-value of the Sargan-statistic does improve quite a bit. This is by no means a formal test, but nevertheless speaks in favour of the dynamic specification (apart from the fact that lagged employment appears highly

[15] The choice of instruments has been carried out in the same manner as for the static model.

significant)[16]. Looking at the results, we see that they are qualitatively quite similar to those obtained previously. The main difference is that the GMM2 estimate of OLD_91 enters significantly, which however might well be a type I error, bearing in mind the small sample properties of the estimator (see Monte Carlo results in e.g. Arellano & Bond (1991) and Bergström (1997)). Lagged employment comes in positive and highly significant, with an estimate of l of 0.70, implying that approximately 70% of the desired change in employment is implemented in the first year. Calculating elasticities we see, from the column under the heading "Model 1" in Table 8, that the short run wage-, income- and grant elasticities are -0.771, 0.355 and 0.014 respectively. Corresponding figures for the long run elasticities are -1.096, 0.504 and 0.019, estimates that are quite similar to those obtained in the static model. Referring to the mentioned findings in the literature and having obtained the above results indicating significant dynamics, we choose to continue our investigation controlling for dynamics, and hence to use equation (12) as our preferred specification.

4.3 Further extensions

As mentioned in section 2, studies of local public economics have often found that grants affect spending differently from own-source revenues.[17] Allowing the parameter estimate on median income to differ from the estimate on received grants we have estimated the following "flypaper model"

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[16] An alternative specification is a static one where the errors follow an AR(1)-process. We have estimated a model with all regressors lagged one period, in which both our preferred specification and the static AR(1)-model are nested. Testing for common factors following, e.g., Sargan (1980), clearly rejects the static model, whereas the restrictions imposed by our preferred specification is easily accepted.

[17] Often, this has been taken as evidence for the presence of a flypaper-effect.

$$n_{it}^{d} = \dot{\iota} + z_{it} + f_1 y_{it}^{m} + f_2 g_{it} t_{it} + j\, w_{it} t_{it} + (1 - l) n_{it-1}^{d} + f_i + e_{it} \quad (13)$$

The results are given in Table 4. The results are, qualitatively, quite similar to those in Table 3. We do however find that the coefficient on grants is significantly higher than the coefficient on median income. Thus, our theoretical model seems to be too restrictive. Calculating the elasticities (given in the second column of Table 8) and comparing them with those of the previous model, we conclude that the grant elasticity is significantly higher when allowing for different coefficients; it rises from 0.014 to 0.041. The wage (income) elasticity is somewhat lower (higher) than in the former model, but not significantly so.

Table 4. Model 2: Dynamic employment model allowing for a "flypaper" effect (eq. 13)

	GMM1			GMM2		
Variable	Coeff	SE	t-ratio	Coeff	SE	t-ratio
EMPL(-1)	0.3750	0.0477	7.8691	0.2959	0.0322	9.2042
INCOME	0.1652	0.0428	3.8581	0.1890	0.0267	7.0865
GRANTS	0.5555	0.0173	3.2099	0.4926	0.0122	4.0439
PRICE	-0.2660	0.0652	-4.0932	-0.2816	0.0399	-7.0511
YOUNG	-0.1835	0.1206	-1.5213	-0.1425	0.0989	-1.4407
YOUNG(-1)	0.2716	0.1150	2.3623	0.1986	0.0912	2.1765
OLD _91	0.7655	0.8795	0.8703	0.8647	0.6121	1.4126
OLD 92_	2.3933	0.8999	2.6595	2.5307	0.6388	3.9616
SOC	0.3998	0.3892	1.0274	0.4052	0.2846	1.4237
	Sargan(1)	Sargan(2)	AR(1)	AR(2)	AR(3)	AR(4)
Test			-5.0400	-0.7833	-1.3532	-0.4686
p-value	0.000	0.328	0.000	0.217	0.089	0.320

Notes:

i) The set of instruments includes GRANTS, YOUNG, YOUNG(-1) and SOC in first differences, PRICE, RMEDIAN and OLD in levels lagged at least 2 years, EMPLOYMENT in levels lagged at least 3 years, as well as the constant and time dummies.

ii) See further notes for Table 2.

Given that grants influence the number of employed differently than the median income, does it matter in what form these grants arrive? As mentioned above, in 1993 there was a major reform that changed the system of intergovernmental grants from specific to more general ones.

How did this change affect the municipalities' demand for labour? In order to investigate this we will split the grant variable into two parts, one before the reform (GRANT_92) and one after the reform (GRANT93_). Looking at the results in Table 5, we can reject the hypothesis that grants have had the same effects on the number of people employed in the municipalities before and after the grant reform at a 10 % significance level. From tables 5 and 8 (Model 3) we can also see that the grant elasticity is lower in the latter time period (0.025 compared to 0.060 for the short run elasticities), a period in which there has been almost exclusively general grants. The estimates of the elasticities are statistically different form each other on the 10% level. This somewhat weak support would nevertheless suggest that there appears to be a tendency for municipalities to spend less on employing new people the more freedom they are given in distributing received grants. In addition, the grant elasticity for the 1993-1995 period is fairly low in economic terms (increasing intergovernmental grants by 1 percent increases the number employed by 0.025 percent).

Table 5. Model 3: Dynamic employment model allowing for a "flypaper" effect and different effects from general and specific grants.

	GMM1			GMM2		
Variable	Coeff	SE	t-ratio	Coeff	SE	t-ratio
EMPL(-1)	0.5134	0.0762	6.7393	0.4051	0.0575	7.0472
INCOME	0.1427	0.0444	3.2121	0.1690	0.0305	5.5327
GRANT_92	0.7538	0.1736	4.3412	0.6261	0.1190	5.2620
GRANT 93_	0.3633	0.1732	2.0973	0.3297	0.1265	2.6068
PRICE	-0.2557	0.0642	-3.9850	-0.2709	0.0397	-6.8155
YOUNG	-0.2153	0.1241	-1.7348	-0.1594	0.1024	-1.5559
YOUNG(-1)	0.2781	0.1165	2.3877	0.2059	0.0940	2.1907
OLD _91	1.2750	0.9388	1.3581	1.2134	0.6370	1.9048
OLD 92_	2.7453	0.9456	2.9033	2.7874	0.6570	4.2429
SOC	0.3298	0.3963	0.8322	0.3759	0.2885	1.3029
	Sargan(1)	Sargan(2)	AR(1)	AR(2)	AR(3)	AR(4)
Test			-5.2141	-0.9201	-1.1478	-0.2231
p-value	0.000	0.227	0.000	0.179	0.126	0.412

Notes:

i) The set of instruments includes GRANT-92, GRANT 93-, YOUNG, YOUNG(-1) and SOC in first differences, PRICE, RMEDIAN and OLD in levels lagged at least 2 years, EMPLOYMENT in levels lagged at least 3 years, as well as the constant and time dummies.

ii) See further notes for Table 2.

The degree of sluggishness in the final model is rather severe ($l = 0.59$), implying that only 59 percent of the desired change in the level of employment is implemented in the same year. From Table 8 we notice that the estimated short run wage elasticity is -0.53 and the long run counterpart is -0.896. The income elasticity is 0.37 in the short run

and 0.62 in the long run. Finally, regarding the socio-economic variables, z, the results in the dynamic specification are very similar to those in the static specification. However, lagged YOUNG is now significant and positive, indicating that the municipalities are somewhat slow to adjust to changes in the cohort consisting of young people. Furthermore, OLD is only significant (positive) after the reform, which may seem reasonable, since the municipalities are responsible for the care of elderly in the latter time period but not in the former.

4.4 Sensitivity analysis

In order to test the robustness of the results above, we will now conduct some sensitivity analysis. There have been arguments in the literature that not all municipalities have the same behavioural patterns. It has for example been argued that ”small” municipalities behave differently from ”large” municipalities (see, e.g., Holtz-Eakin & Rosen (1991) and Borge & Rattsø (1993)). Furthermore, it is possible that ”socialist” municipalities behave differently from ”conservative” ones. To investigate these two topics, we will now divide our original sample into four sub-samples, first according to size and then according to political majority. We will take the model in Table 5 as our point of departure when investigating whether municipal labour demand is different in different types of municipalities.

Does the size of the municipality matter?

There are several ways of measuring the size of a municipality. We assume that the relevant definition is population, and thus define small municipalities as municipalities having a population of less than 15000 for all years 1988 to 1995 and large municipalities as municipalities having a population of more than 20000 for the same time period. This leaves us with 103 small and 94 large municipalities.

The results are given in Table 6. Looking at the specification tests we cannot reject that the models are correctly specified. From Table 8 we see that the finding in the full sample above, i.e. that the grant elasticity was higher with specific grants than with general ones, still holds for both small and large municipalities. Whereas this difference is insignificant for large municipalities, it is significant at the 5% level for small ones. Furthermore, we find indications that the adjustment process is slower in large municipalities (where 45% of the desired change is implemented in the first year) than in small (where 53% of the desired change is implemented in the first year). The estimates are, however, not significantly different from each other. The demographic structure seems to be more "important" (in a statistical sense) in small municipalities than in larger ones.

Table 6. Model 4 & 5: Dynamic employment model allowing for a 'flypaper" effect and different effects from general and specific grants.

Sample split over small and large municipalities

	Small municipalities				Large municipalities			
	GMM1		GMM2		GMM1		GMM2	
Variable	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio
EMPL(-1)	0.5608	5.1102	0.4735	7.6871	0.5310	5.9879	0.5541	20.7300
RMEDIAN	0.1340	2.2187	0.1390	5.0231	0.0953	1.7783	0.0905	4.3619
GRANT_92	0.3610	1.9372	0.4648	4.6696	0.1340	0.5685	0.1987	1.7780
GRANT93_	-0.0278	-0.1921	0.1207	1.3189	0.1320	0.5870	0.1673	2.0725
PRICE	-0.0918	-1.4472	-0.1390	-4.9781	-0.2390	-3.0088	-0.2140	-8.1630
YOUNG	-0.3800	-1.9912	-0.2620	-2.3387	-0.7470	-0.4299	-0.3550	-0.3642
YOUNG(-1)	0.2640	1.2451	0.4794	4.3205	0.5480	0.3572	0.4009	0.4831
OLD_91	0.3800	0.0396	0.8917	1.8007	-0.2180	-0.0220	0.5473	1.4260
OLD92_	1.2000	1.2073	1.9376	3.6735	1.2900	1.2683	1.8244	4.8457
SOC	0.1140	0.1929	-0.1760	-0.4798	-0.2200	-0.5491	-0.1210	-0.0696
	Test	p-value				Test	p-value	
Sargan (1)		0.321			Sargan (1)		0.000	
Sargan (2)		0.074			Sargan (2)		0.556	
AR(1)	-4.8207	0.000			AR(1)	-4.5907	0.000	
AR(2)	-0.8815	0.189			AR(2)	0.6211	0.268	
AR(3)	-1.1027	0.135			AR(3)	-1.6814	0.046	
AR(4)	1.1764	0.120			AR(4)	-0.8541	0.200	

Notes

i) The set of instruments includes INCOME, YOUNG, YOUNG(-1) and SOC in first differences, PRICE and OLD in levels lagged 2 and more years, EMPLOYMENT in levels as well lagged 3 and more years, as well as the constant and time dummies.

ii) See further notes for Table 2.

Do political preferences matter?

Next we divide the sample into municipalities with ”socialist” preferences and municipalities with ”conservative” preferences. We define socialist municipalities as municipalities in which the ”left” parties (i.e. S and V) have constituted a majority in all three elections in the studied period and conservative municipalities as municipalities in which the ”right” parties (i.e. C, KDS, Fp, and M) have constituted a majority in at least two of the three elections in the studied period. In our sample, there are 92 socialist and 83 conservative municipalities.

Comparing the results in tables 7 and 8 (elasticities), we see that the grant elasticity is still higher before the reform than after for both political municipality types[18]. Looking at the results for socialist municipalities, the difference between the grant elasticity before and after the reform, is statistically significant at the 5% level. As a matter of fact, post reform grant elasticity is not significantly different from zero for socialist municipalities, implying that these municipalities have not used any general grants to increase employment. We also find that the adjustment process is significantly slower in socialist municipalities ($l = 0.42$) than in conservative municipalities ($l = 0.57$). Noteworthy is finally that median income is insignificant for socialist municipalities and that both the income elasticity and the wage elasticity are significantly lower in socialist municipalities than in conservative ones.

[18] The AR(2) test in the model for socialist municipalities indicates second order serial correlation. The Sargan test on the other hand seems quite reassuring.

Table 7. Model 6 & 7: Dynamic employment model (eq. 13)

Allowing for a "flypaper" effect and different effects from general and specific grants.

Sample split over conservative and socialist municipalities

	Socialist municipalities				Conservative municipalities			
	GMM1		GMM2		GMM1		GMM2	
Variable	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio	Coeff.	T-ratio
EMPL(-1)	0.5813	5.6603	0.5797	18.1280	0.4329	4.7033	0.4276	12.7840
RMEDIAN	0.0324	0.4653	0.0239	1.5687	0.0968	2.3180	0.0884	6.0556
GRANT_92	0.5144	2.8745	0.4948	10.406	0.4109	1.4482	0.3498	3.6236
GRANT93_	0.0584	0.3353	0.0439	1.0614	0.2778	1.6126	0.2349	3.6073
PRICE	-0.0594	-0.7536	-0.0642	-3.4635	-0.1630	-2.4488	-0.1570	-7.7971
YOUNG	0.2282	0.9100	0.1686	1.5914	-0.4010	-1.7757	-0.3400	-3.3258
YOUNG(-1)	0.2305	0.9520	0.1588	1.6116	0.5605	2.5280	0.4659	4.7586
OLD_91	0.0890	0.1196	-0.1130	-0.4565	0.1923	0.1725	0.2127	0.0504
OLD92_	1.7350	2.1546	1.3963	5.9622	1.9355	1.7207	1.7195	3.8876
	Test	p-value				Test	p-value	
Sargan (1)		0.042			Sargan (1)		0.000	
Sargan (2)		0.405			Sargan (2)		0.335	
AR(1)	-4.9344	0.000			AR(1)	-4.5962	0.000	
AR(2)	-2.0061	0.023			AR(2)	0.4013	0.345	
AR(3)	0.3906	0.348			AR(3)	-0.3119	0.378	
AR(4)	0.1366	0.446			AR(4)	-0.4589	0.323	

Notes:

i) The set of instruments includes INCOME, YOUNG, YOUNG(-1) and SOC in first differences, PRICE and OLD in levels lagged 2 and more years, EMPLOYMENT in levels as well lagged 3 and more years, as well as the constant and time dummies.

ii) See further notes for Table 2.

Table 8. Elasticities (standard errors)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	Short run elasticities						
Wage	-0.771 (0.1158)	-0.554 (0.0786)	-0.533 (0.0782)	-0.422 (0.0517)	-0.273 (0.0548)	-0.126 (0.0365)	-0.309 (0.0397)
Grant	0.014 (0.0023)	0.041 (0.0102)					
Grant: Pre reform			0.060 (0.0113)	0.019 (0.0107)	0.044 (0.0095)	0.047 (0.0045)	0.033 (0.0092)
Grant: Post reform			0.025 (0.0096)	0.013 (0.0061)	0.009 (0.0070)	0.003 (0.0031)	0.018 (0.0050)
Income	0.355 (0.0600)	0.412 (0.0582)	0.369 (0.0667)	0.198 (0.0453)	0.303 (0.0602)	0.052 (0.0333)	0.193 (0.0319)
	Long run elasticities						
Wage	-1.096 (0.2000)	-0.787 (0.1246)	-0.896 (0.1789)	-0.946 (0.1338)	-0.518 (0.1318)	-0.300 (0.0987)	-0.540 (0.0837)
Grant	0.019 (0.0039)	0.059 (0.0154)					
Grant: Pre reform			0.100 (0.0201)	0.042 (0.0235)	0.084 (0.0195)	0.112 (0.0106)	0.058 (0.0148)
Grant: Post reform			0.042 (0.0185)	0.029 (0.0145)	0.017 (0.0142)	0.008 (0.0075)	0.031 (0.0093)
Income	0.504 (0.1014)	0.586 (0.0918)	0.620 (0.1501)	0.443 (0.1101)	0.575 (0.1393)	0.124 (0.0803)	0.337 (0.0675)

Notes:

i)Elasticities and their standard errors have been obtained using second step estimates applying the delta-method.

ii) Model 1 = Basic Model, Model 2 = Flypaper Model, Model 3 = Flypaper + Grant Reform Model Model 4 = "Large" Municipalities, Model 5 = "Small" Municipalities, Model 6 = "Socialist" Municipalities

6. Summary and Concluding Remarks

A special feature of the Scandinavian countries is the prominent role played by the local governments. Their responsibilities cover, among other things, the supply of private goods such as schooling, day care and care for elderly. As a consequence, local governments in these countries are, as measured by size, important employers. In Sweden, the local governments constitute the largest single employer in the economy (approximately 30% of all employed are employed by the local governments). Despite this, studies investigating municipal labour demand in Sweden are lacking. In an attempt to start filling the gap, we have in this paper investigated the determinants of municipal labour demand in Sweden during the period 1988 to 1995, a period in which the municipalities faced new challenges in form of diminishing tax bases and shifting demographic structures (more young and more retired people).

We assumed that the decision making process in the municipalities can be described by a median voter model, where each median voter maximises his or her utility function subject to both their individual budget constraint and their municipality's budget constraint. In addition, we assumed that adjustment costs are prevalent in municipal labour demand and therefore allowed for a partial adjustment process. In the empirical specification of the theoretically derived labour demand function, we controlled for unobserved, municipality-specific, fixed effects and macro economic shocks that are common to all municipalities. We also controlled for the demographic structure, motivated mainly by the potentially idiosyncratic effects from the care-for-the-elderly reform undertaken during the period that we study.

In this study we estimated wage-, grant-, and (median) income elasticities, investigated what effects political factors and the demographic structure in the municipalities have on municipal labour demand, and examined if there were any sluggishness in the adjustment

of municipal labour demand. We estimated with all municipalities pooled as well as on four sub-samples: municipalities with "large" populations, municipalities with "small" populations, "socialist" municipalities, and "conservative" municipalities.

By utilising a major grant reform in 1993, in which a switch from mainly specific to mainly general grants occurred, we were able to identify which type of grants that have the largest effects on municipal employment. We found a larger grant elasticity before the reform, which may suggest that if the central government seeks to increase municipal employment, it should target grants, rather than distributing them in more general forms. We found a short run wage elasticity of approximately -0.5 and a long run ditto of approximately -0.9. The long run elasticity is not significantly different from one. We furthermore found a quite sluggish adjustment process: only 60% of the desired change in municipal employment is implemented in the first year.

From the sub-group estimations it turned out that municipalities led by a socialist government during the entire period 1988-1995 showed a different pattern than other municipalities. They had the lowest wage elasticity (-0.13 in the short run), they had a low and insignificant income elasticity, and they had the most pronounced difference in pre- and post-reform grant elasticities.

In this paper we have studied total municipal employment. It goes without saying that the wage-, grant, and income elasticities as well as the demographic structure can have quite different effects on different types of municipal employment. Especially, it would be interesting to investigate the effects on the municipalities' most important areas of responsibility: day care, care for the elderly, and education. This is on the top of our agenda for future research.

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Appendix A

Description of the data set

The data-set consists of a panel of Swedish municipalities over the years 1988-1995. Out of the original 288 municipalities 38 were discarded for the following reasons.

i) Newly created/split municipalities: 461, 488, 1535, 1814

ii) Municipalities for which missing values were observed: 127, 138, 482, 560, 604, 682, 780, 1080, 1256, 1260, 1277, 1401, 1419, 1580, 1582, 1585, 1643, 1661, 1682, 1785, 1814, 1982, 1984, 2023, 2026, 2034, 2039, 2080, 2081, 2082, 2303, 2403, 2425, 2481, 2506, 2518.

iii) Municipalities that handle tasks not normally handled by municipalities: 980, 1280, 1480

The following variables are used in this paper either asregressors or as instruments:

Employment

Number of people employed by the municipality per inhabitant. The number of employees is computed by transforming part-time employees into a corresponding number of full-time employees.

Source: Financial statement for Swedish municipalities (Vad kostar verksamheten i din kommun?)

Average: 0.0613 Std.Dev.: 0.0086

Real Median income

Median yearly household income in the municipality deflated byCPI. The population consists of inhabitants older than 20 years.

Source: For the first three years Statistics Sweden ”Income and allowances (Inkomster och Bidrag)” was used. Since the measure reported therein was not comparable for the years to follow, this measure was constructed using the LINDA database instead (See Edin & Fredriksson (1997) for description of the LINDA-base). LINDA is not an exhaustive sample of inhabitants, which could potentially cause problems for the values computed for small municipalities. We have however investigated the problem by computing real median income for 1990 using both the Statistics Sweden material and the LINDA-base, and have not found the difference between the two values for median income statistically significant for any municipality.

Average: 121217.2 Std.Dev.: 13607.73

Real Average income

Average yearly household income in the municipality deflated by CPI. The population consists of inhabitants older than 20 years.

Source: See Real median income.

Average: 143381.9 Std.Dev.: 19378.13

Tax-Price

Real Median income/Real Average income

Average: 0.8485039 Std.Dev.: 0.0434025

Real Grants

Targeted and general grants received from central authorities deflated by CPI. Expressed as SEK per inhabitant.

Source: Yearbook for Swedish Municipalities

Average: 6603.43 Std.Dev.: 2380.95

Income

Real Median Income + Tax-price * Real Grants

Average: 126852.5 Std.Dev.: 12944.82

Real Wages

Total sum of wages paid in each municipality divided by the number of employees computed in the same way as above, deflated by CPI.

Source: Financial statement for Swedish municipalities (Vad kostar verksamheten i din kommun?)

Average: 131639.3 Std.Dev.: 6237.96

Price

Tax-Price * Real Wages

Average: 111693 Std.Dev.: 7750.36

Young

Share of inhabitants younger than 16 years of age.

Source: Yearbook for Swedish Municipalities

Average 0.2028 Std.Dev.: 0.0019

Old

Share of inhabitants older than 80 years of age.

Source: Yearbook for Swedish Municipalities

Average 0.1852 Std.Dev.: 0.0040

Soc

Dummy variable taking the value of 1 whenever a municipality is governed by a socialist local government, i.e. S + V constituting a majority, and zero otherwise.

Source: Yearbook for Swedish Municipalities

Average: 0.4535714 Std.Dev.: 0.4979668

Appendix B

Covariances of key variables

Table B1 Employment

	1989	1990	1991	1992	1993	1994	1995
1989	0.10639						
1990	-0.082675	0.68759					
1991	-0.0029818	-0.051821	0.19851				
1992	-0.035028	0.74172	0.013488	1.5627			
1993	0.029849	-0.15985	0.029284	-0.18043	0.11633		
1994	0.012891	0.055248	0.0026704	0.12306	0.040653	0.10371	
1995	-0.020621	0.10111	-0.015553	0.15938	-0.037602	0.035051	0.25098

Table B2 Income

	1989	1990	1991	1992	1993	1994	1995
1989	0.26812						
1990	-0.0075065	0.26572					
1991	-0.44133	-0.045203	0.95879				
1992	0.040721	-0.0065251	-0.10807	0.19154			
1993	-0.086920	-0.039771	0.13364	-0.057297	0.16564		
1994	-0.047268	-0.014423	0.058186	0.010237	-0.028917	0.14467	
1995	0.050588	-0.021696	-0.074817	-0.0026630	-0.017344	-0.062389	0.16112

Table B3 Price

	1989	1990	1991	1992	1993	1994	1995
1989	0.30078						
1990	-0.17323	0.34429					
1991	-0.21062	-0.0072075	0.60696				
1992	0.22954	-0.10709	-0.42685	0.56715			
1993	-0.26112	0.11669	0.29555	-0.43827	0.70841		
1994	-0.0026841	0.019661	-0.043279	0.016551	-0.070804	0.29474	
1995	0.15652	-0.11203	-0.16104	0.19684	-0.24719	-0.17154	0.47106

Table B4 Grants

	1989	1990	1991	1992	1993	1994	1995
1989	1.2514						
1990	-0.43866	1.2502					
1991	0.14178	-0.25107	0.88811				
1992	0.61584	0.75737	0.41685	4.1711			
1993	-0.28208	-2.0481	-0.51947	-6.0839	26.983		
1994	0.15441	-0.41498	0.16563	-0.38820	-6.0896	11.664	
1995	-0.42275	-0.34899	-0.083882	-2.0346	3.9616	-0.34195	3.5456

Table B5 Employment - Income

	1989	1990	1991	1992	1993	1994	1995
1989	-0.040406	0.014826	0.071666	0.0052475	0.0059775	-0.0011478	0.0025630
1990	0.36697	-0.026736	-0.60699	0.076015	-0.12375	-0.070290	0.071167
1991	-0.033491	0.017537	0.051854	0.033875	0.0036319	0.017246	0.010999
1992	0.49704	0.0026731	-0.78868	0.20278	-0.17851	-0.10015	0.15312
1993	-0.11266	0.010090	0.18631	0.015171	0.036097	0.021392	-0.021120
1994	0.031079	-0.0016956	-0.051041	0.033220	-0.015818	-0.0007744	0.018593
1995	0.098784	0.0067075	-0.17867	0.025540	-0.026914	-0.014906	0.017129

Table B6 Employment - Price

	1989	1990	1991	1992	1993	1994	1995
1989	-0.091305	0.043862	0.042511	-0.045190	0.042672	-0.0057589	-0.035513
1990	0.33872	-0.28094	-0.31260	0.39372	-0.46735	-0.021780	0.24695
1991	-0.031003	0.038427	-0.025940	-0.0067697	0.045936	-0.0086460	-0.020164
1992	0.36357	-0.23540	-0.45858	0.44639	-0.62175	-0.055765	0.31321
1993	-0.10241	0.059543	0.11013	-0.11915	0.16153	-0.012861	-0.086308
1994	0.020210	-0.017991	-0.024515	0.020123	-0.012507	-0.024550	-0.0037688
1995	0.086195	-0.025924	-0.12064	0.10100	-0.13600	0.019923	0.015677