The effects of grants and wages on municipal labour demand

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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, which we interpret as evidence that general grants have less employment effects than specific ones. We further find a short run wage elasticity of approximately −0.5 and a long run ditto of approximately −0.9, and a quite sluggish adjustment process: only 60% of the desired change in municipal employment is implemented in the first year.

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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 accounts for about 30% of total employment in the economy. The

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E-mail address: eva.mork@ifau.uu.se (E. Mörk).
1 Formerly Johansson.
2 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.
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 general 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 aim in this paper at estimating wage elasticities for municipal labour demand and at evaluating the effects of switching from specific intergovernmental grants to more general ones, where the municipalities may use grants at their disposal more freely. These latter 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. As we proceed, we will also examine whether the adjustment process in municipal labour demand is sluggish or not. Evidence in Dahlberg and Johansson (1998, 2000) and Dahlberg and Jacob (2000) indicates that it might be important to control for dynamics when investigating the behaviour of Swedish local governments. Furthermore, Holtz-Eakin and 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 and Tomola, 1977). For an overview of earlier studies, see Ehrenberg and Schwarz (1986). Holtz-Eakin and Rosen (1991) do not study the determinants of municipal labour demand per se, but rather test rationality, in the sense of Hall (1978), assuming that the local government decision-maker maximises an intertemporal utility function. In this paper, we adopt a median voter model where 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 derive a municipal labour demand function which we estimate using panel data methods.

The paper is organised as follows: In the next section, we briefly present some institutional facts for Sweden. In Section 3, we set up and describe the theoretical model. Section 4 gives some characterisations of the data to be used. Section 5 presents our empirical findings, whereas the final section summarises and concludes.

2. Some institutional facts

There are 290 municipalities in Sweden, with an average size of 30,827 inhabitants. Municipal size differs however much; the smallest municipality has 2639 inhabitants, whereas the largest has as many as 754,948 inhabitants. The municipalities have broad responsibilities ranging from personal development and social welfare of individual members to such community issues as the planning, maintenance and protection of the
physical environment; emergency services, civil defence, transportation and communication; technical services like water, sewage and energy; and recreational and cultural programs. Education is the largest branch of municipal operations, accounting for approximately 30% of total municipal spending. The second largest is care of the elderly and people with functional impairments (approximately 23%) followed by day care (approximately 15%). The development of the municipalities’ total expenditures (per capita) over the studied period is presented in Fig. 1. As shown in the figure, municipal expenditures are increasing over time.

There is in Sweden a very long tradition cherishing local self-government. This principle of local self-government is even declared in the Swedish Constitution. The decision making power of local governments is exercised by elected assemblies: municipality councils. The members of the councils are elected for 4-year terms. The elected representatives are responsible for administration, implementing and drafting of decisions.

The municipalities have the constitutional right to set their own income tax. On average, approximately 57% of their revenues comes from the local income tax. Fees, loans and other income sources constitute approximately 21% of total revenues, while intergovernmental grants make up approximately 22%. Thus, roughly 80% of local government revenues are in principle at their own discretion. Furthermore, Swedish municipalities have the statutory rights to borrow money. The domestic and international credit markets decide the limits and terms of such loans. For example, some local governments have been borrowing money from abroad and they have therefore been credit rated at rating firms such as Standard & Poor. A consequence of the right to borrow is that there is large cross-sectional variation in the level of debt among the municipalities. For example, in 1994 the average level of debt was 14,900 SEK per capita and the

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3 In 1992, the responsibility for care for the elderly was transferred from the counties to the municipalities (in a reform that was labelled “ÅDEL-reformen”).
4 Before 1994, the election term was 3 years.
5 The figures presented here are in real terms, deflated by the implicit GDP deflator (deflated to 1991 prices).
standard deviation was 6200. The minimum level of debt was 4000 and the maximum 49,400 SEK per capita.

Local government operations could be divided into mandatory and voluntary areas. Examples of mandatory tasks are education and social services. Examples of voluntary tasks are cultural affairs, recreational programs and technical operations such as energy distribution. However, there are large differences in the freedom of action in running a mandatory operation. Murray (1985) estimated that about 40% of the total expenditures are to be considered mandatory. Thus, local governments could in principle decide on at least 60% of their own expenditures. To put this statement in perspective we can look at the cross-sectional variation in expenditures. During the period 1974–1994, the average expenditures were about 28,000 SEK per capita in real terms and the standard deviation roughly 5600. Thus, there is a far bit of cross-sectional variation. Finally, the state plays no part in either monitoring or approving local government accounts, which are under the review of accountants.

The main services that the municipalities supply (education, elderly care, and day care) are all labour-intensive, implying that a large part of all employed in Sweden is employed by the municipalities; Fig. 2 displays the number of persons employed in different sectors in Sweden. Wages and payroll taxes consequently constitute a large part of municipal expenditures (approximately 50%). Municipal wages are set in central negotiations and, due to rather strict labour market regulations protecting the employee and different types of hiring costs, the municipalities are not likely to be able to adjust labour freely.

In the early 1990s, there was a lively discussion in Sweden that the freedom of the municipalities had to be increased further. As a reaction to this discussion, there was a
major grant reform in 1993 aimed at increasing the municipalities’ freedom to act. Before the reform, most grants came in targeted form, but after the reform, the major part of the grants comes as general lump-sum grants. The targeted grants before the reform were large in number; in 1990 there existed over 100 such grants. Furthermore, some of the targeted grants were of a matching type. The effect of the 1993 reform on intergovernmental grants is illustrated in Fig. 3. In the figure, we can observe that not only did the form the grants came in change in 1993, but so did the amounts; after the reform, the level of grants was considerably lower.

3. 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 namely 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

\[
U_{it} = U(X_{it}, e_{it}),
\]

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. The individual budget constraint states that the level of private consumption cannot exceed the median voter’s disposable income

\[
X_{it} = (1 - t_{it}) y^m_{it},
\]

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

\[
t_{it} N_{it} \bar{y}_{it} + G_{it} = w_{it} N_{it}^d,
\]

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 \( e_{it} \).\(^6\) Solving Eq. (3) for the local tax rate, and substituting into Eq. (2) yields

\[
X_{it} = y^m_{it} + \tau_{it} (g_{it} - w_{it} n_{it}^d),
\]

where \( g_{it} \) is intergovernmental grants per capita and \( \tau_{it} = y^m_{it}/\bar{y}_{it} \) is the tax price paid by each median voter. The tax price is to be interpreted as the marginal cost, in terms of increased tax payments, facing an individual for an additional unit of the publicly provided good. Substituting Eq. (4) and the production function \( e_{it} = f(n_{it}^d) \) into Eq. (1) yields the following maximisation problem

\[
\max_{n^d} U = U[y^m_{it} + \tau_{it} (g_{it} - w_{it} n_{it}^d), f(n_{it}^d)].
\]

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

\(^6\) 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 \( e_{it} = f(n_{it}^d) \) in per capita terms. This assumption is perhaps not unrealistic having the types of services municipalities supply in mind. We also abstract from fees, since this is only a minor income source for the municipalities.
production function takes the simple form \( e_{it} = an_{it}(d) \) and that the utility function takes the form

\[
\max_{n_{it}} \ U = \exp \left\{ -\left( 1 + \frac{\beta (y_{it}^m - \tau_{it}(w_{it}n_{it}^d - g_{it}) + s_{it})}{b - an_{it}^d} \right) \right\} \left( \frac{\beta}{an_{it}^d - b} \right),
\]

where \( b = a(z/\beta), \ s_{it} = (z_{it}/\beta) + (z/\beta^2), \) and \( z = \delta_0 + \delta_1z_1 + \delta_2z_2 + \delta_3z_3 + \ldots \) 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 Eq. (6) yields the following municipal labour demand function\(^7\)

\[
n_{it}^{d*} = z_{it} + \beta (y_{it}^m + g_{it}\tau_{it}) + \omega w_{it}\tau_{it}.
\]

Earlier studies in the literature on local public expenditures indicate some kind of dynamic behaviour of local governments (see, e.g., Holtz-Eakin and Rosen, 1991 on US data, Dahlberg and Johansson, 1998, 2000; Dahlberg and Jacob, 2000 on Swedish data, and Borge and Rattsø, 1993, 1996; Borge et al., 1996 on Norwegian data). Incorporating dynamics into the median voter model is by no means easy, since the identity of the median voter might change over time. We have therefore chosen to introduce dynamics by combining the static median voter model with a partial adjustment rule. Since it is likely that municipalities may not adjust labour freely, due to labour market regulations and hiring costs, we would expect actual employment to deviate from the level municipalities would have chosen had these restrictions not been present. Our dynamic formulation separates the desired amount of employment \((n_{it}^{d*})\) from actual employment \((n_{it}^d)\) for each year. The desired level of employment is determined by Eq. (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, \(\lambda\), of the desired change:

\[
n_{it}^d - n_{it-1}^d = \lambda(n_{it}^{d*} - n_{it-1}^d).
\]

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

Substituting Eq. (7) into Eq. (8) yields

\[
n_{it}^d = z_{it} + \phi(y_{it}^m + g_{it}\tau_{it}) + \omega w_{it}\tau_{it} + (1 - \lambda)n_{it-1}^d.
\]

\(^7\) 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 et al., 1979 for a theoretical model, and Ahlin and Johansson, 2001 for Swedish evidence). In relation to this, it might be noted that we assume that the median voter is not employed by the municipality.
where \( \mu_j = \lambda \delta_j, \ j = 0,1,2, \ldots, \phi = \lambda \beta, \ \varphi = \lambda \alpha \) and \( z = \mu_0 + \mu_1 z_1 + \mu_2 z_2 + \mu_3 z_3 + \ldots \). 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\(^8\)

Median income elasticity\(^9\): \( \eta_{\mu m}^m = \frac{y_{m}^m}{n^m_{l} \phi} \).

Wage elasticity: \( \eta_{\mu w} = \frac{w_{l} \phi}{n^m_{l} \phi \tau_{l}^m} \).

Grant elasticity: \( \eta_{\mu g} = \frac{g_{l}^m}{n^m_{l} \phi \tau_{l}^m} \).

When confronting the model with data, we will follow earlier studies and characterise the median voter as the voter with median income (see Theorem 1 in Bergstrom and Goodman, 1973).

According to the theory laid out here (cf. Eq. (9)), it should make no difference whether money is collected through local taxes or through general grants; an increase in one of them should yield the same increase in local 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 typically 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 a phenomenon that has been labelled the “flypaper effect”.\(^10\) Furthermore, given that 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 different effects on labour demand using the following equation.

\[
n_{l}^m = z_{l} + \phi_{1} y_{l}^m + \phi_{2} g_{l}^m \tau_{l}^m + \varphi w_{l} \tau_{l}^m + (1 - \lambda) n_{l}^m - 1 \quad (10)
\]

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. Even though the theoretical model, as we have formulated it, indicates that targeted and general grants ought to have the same impact on municipal employment, it might be the case that there are restrictions tied to targeted grants, implying that the municipalities cannot use the money as they would otherwise have wanted.\(^11\) If grants instead come with no strings attached, the municipalities can choose to use the money to, e.g. increase wages and decrease taxes, in addition to raising employment.\(^12\) As described in Section 2, there was a major grant reform

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\(^8\) The long run elasticities are obtained by dividing the short run elasticities with \( \lambda \). The expressions for the elasticities in the static model are the same, however, substituting \( \beta \) for \( \phi \) and \( \alpha \) for \( \varphi \).

\(^9\) Derivation of Eq. (9) with respect to \( y_{l}^m \) and taking the effect on \( \tau_{l}^m \) 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.

\(^10\) The name refers to the tendency for money to get stuck where it hit. For a recent overview of the flypaper literature and a discussion of possible explanations for the flypaper effect, see Bailey and Connolly (1998).

\(^11\) Of course the municipalities can solve this problem by reallocation among the different services.

\(^12\) One could also argue that grants before the reform were not only targeted but also matching. In that case, the budget restriction would look like \( t_{l} N_{l} \hat{\delta} \phi = (1 - m_{l} w_{l} N_{l}^{\alpha}) \), where \( m_{l} \) is the matching rate, instead of Eq. (3). In order to estimate this model, we would need the matching rates. There are however several problems with this, not only were not all targeted grants matching (which could of course be solved by using matching rate 0), but the matching rates differed for different types of grants, making computation almost impossible.
in 1993 that changed the system of intergovernmental grants from mainly targeted to mainly general ones. This gives us an opportunity to investigate whether targeted grants have had a different effect on local public employment than general ones.

Rewriting Eq. (10) and letting grants have a different impact before and after the 1993 grant reform yields the following equation:

\[ n_{it}^d = z_{it} + \phi_1 y_{nt}^{m} + \phi_2 D_t g_{it} \tau_{it} + \phi_3 (1 - D_t) g_{it} \tau_{it} + \phi w_{it} \tau_{it} + (1 - \lambda) n_{it-1}^d \]  

(11)

where $D_t = 1$ for the years 1990–1992, and $D_t = 0$ for the period 1993–1995. Eq. (11) will form the basis for our empirical investigation of the dynamic model in Section 5.

### 4. Data

The data set we use is obtained from Statistics Sweden and covers 245 Swedish municipalities during the period 1988–1995. The dependent variable in our theoretically derived model is the number of employed 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. In the estimations we divide the income variable into its components in order to investigate any asymmetric effects as well as the effect of different types of grants. Hence we estimate the model with the regressors MEDIAN, GRANT_92 and GRANT93_ (the grants variables are multiplied with the tax price), where we use the grant reform in order to separate between general and targeted grants. In addition to these variables, we control for demography by including the share of people younger than 16 (YOUNG) and this variable lagged 1 year (YOUNG(−1)) as well as the share of people older than 79 (OLD). In order to control for the care for elderly reform in 1992, we have interacted the latter variable with a time dummy, hence using two variables: OLD_91, which takes the value zero after 1991, and OLD92_, which takes the value zero before 1992. Finally, following Aronsson and Wikström (1996), we have chosen to include a political variable to control for the political majority in the municipal council by letting the variable SOCIALIST take the

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13 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.

14 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 variables of interest. Finally, three municipalities (Gotland, Malmö and Göteborg) were excluded because they handle activities normally handled by the county councils. In Appendix A, we list the excluded municipalities.

15 Number of employed are measured in terms of full time equivalents.

16 Another way would be to separate between general and targeted grants for each year, since we see in Fig. 3 that both types of grants exist over the whole investigated period. Given the discussion in Sweden that surrounded the grant reform (see Section 2), we do however believe that the reform marked a new time era because of its outspoken intention to increase municipal freedom. Our choice is further motivated by lack of data at the disaggregated level.
value one when the Social Democrats (S) and the Left Party (V) have more than 50% of the seats and zero otherwise.\textsuperscript{17}

5. Empirical results

5.1. Dynamic model

In Section 3, we presented four different specifications of the municipal labour demand function, ranging from a static model directly derived from the maximisation problem (Eq. (7)) to a dynamic model where the income variable had been split into three components (Eq. (11)). In order to decide which of these models that is most appropriate to use, we have estimated all four models and conducted a number of specification tests. Starting out with the static model and then incorporating dynamics, it turns out that the parameter estimate on the lagged dependent variable is significantly different from zero, hence indicating that a dynamic model is appropriate to use. A difference-Sargan test points in the same direction.\textsuperscript{18} Extending the model further and investigating whether income and grants have the same impact on labour demand, in the spirit of the flypaper effect, we find that we have to reject the null of equal parameters for the income and grant variables. The results from these estimations are all presented in Bergström et al. (1998). Given that grants influence the number of employed differently than 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 targeted 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\textsubscript{92}) and one after the reform (GRANT\textsubscript{93}).

The model we estimate is hence the following empirical specification of Eq. (11):

\begin{equation}
\begin{aligned}
\text{n}^d_{it} &= l_t + z_{it} + \phi_1 y_{it}^m + \phi_2 g_{it}^m \tau_{it} + \phi_3 (1 - D_t) g_{it}^m \tau_{it} + \phi w_{it} \tau_{it} + (1 - \lambda) n^d_{i t-1} + f_i + \varepsilon_{it} \\
\end{aligned}
\end{equation}

\textsuperscript{17} For exact definitions and a description of the socio-economic variables, see Appendix A. The inclusion of the lagged value for YOUNG is mainly motivated by our empirical finding that the lag turned out to be significant in more cases than the contemporaneous observation. 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. It is not obvious whether one should include the political variable SOCIALIST in the analysis or not. Even though it does not really belong in the median voter model, it might be the case that it captures some important ideological aspect that actually matters empirically. Our results are however not sensitive to whether SOCIALIST is included or not; it turns out that almost nothing happens if we disregard from SOCIALIST 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 SOCIALIST as a regressor. The estimates with SOCIALIST excluded are available on request.

\textsuperscript{18} 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 are easily accepted.
where \( D_t = 1 \) for the period 1988–1992, and \( D_t = 0 \) for the period 1993–1995, 
\[ z_{it} = \delta_0 + \delta_1 \cdot \text{YOUNG}_{it} + \delta_2 \cdot \text{YOUNG}_{it-1} + \delta_3 \cdot \text{OLD}_{91it} + \delta_4 \cdot \text{OLD92}_{it} + \delta_5 \cdot \text{SOCIALIST}_{it} \]

\( f_i \) is a municipality specific fixed effect characterising time-invariant attributes such as geographical location, \( it \) is a time dummy controlling for macroeconomic shocks that affect all municipalities in the same way, and \( \epsilon_{it} \) is a white noise error term. This equation will be estimated in first differences using the GMM estimation technique suggested by Holtz-Eakin et al. (1988) and Arellano and Bond (1991).19

Looking at the results in Table 1, we can first note that the degree of sluggishness is rather severe (\( \lambda = 0.59 \)), implying that only 59% of the desired change in the level of employment is implemented in the same year. The dynamic process is hence considerably more sluggish than the one found in Dahlberg and Jacob (2000). They find that almost 90% of the desired change is implemented the same year. Dahlberg and Jacob do however study municipal consumption and it is likely that consumption can be changed faster than employment, since the latter is regulated by contracts of employment, etc. We can further note that both the price and the income variables enter significantly and with their expected signs. Concentrating on the grant variable, we 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. Investigating the sizes of the different effects by calculating elasticities, we find that the grant elasticity is lower in the latter time period (0.025 compared to 0.060 for the short run elasticities; see column 1 in Table 4), a period in which there has been almost exclusively general grants. The estimates of the elasticities are statistically different from each other on the 10% level. This somewhat weak support would nevertheless suggest that there appears to be a tendency for municipalities to employ fewer people the more freedom they are given in distributing received grants.20 In addition, the grant elasticity for the 1993–1995 period is fairly low in economic terms (increasing intergovernmental grants by 1% increases the number employed by 0.025%). The wage elasticity equals – 0.533 with an estimated standard

19 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 and Bond (1991). 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 an overidentified 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 by Arellano and 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). The first difference estimates are presented in Table 2. We cannot reject the model specification in the GMM2 column: Neither the Sargan statistic, nor the AR(1)–AR(4) tests reject the specification. Since the model specification in GMM1 is rejected by means of the Sargan statistic, we have an indication that heteroscedasticity might be prevalent. The test results hence indicate that we shall rely on the second-step estimates.

20 The periods before and after the grant reform are different in other aspects as well; for example, the economic crises in Sweden affected the municipalities to a larger extent during the latter period. Did the changed economic situation play a greater role than the grant reform? Or did perhaps the grant reform itself affect the parameter estimates of the other variables? In order to examine this, we have re-estimated the model in Table 1 allowing the parameter estimates on the other variables to differ before and after 1993 as well. Doing this, we found that only the parameters on grants differed significantly from each other before and after the reform.
error of 0.078 in the short run and — 0.896 in the long run with a corresponding standard error of 0.179. This implies that the long run wage elasticity is not significantly different from — 1. The income elasticity is 0.369 (standard error 0.067) in the short run and 0.620 (standard error 0.15) in the long run. All these elasticities are summarised in Table 4.

As we saw in Fig. 3, intergovernmental grants were considerably lower after the grant reform than before. It is possible that municipalities hit by this budget squeeze tried their very best to avoid firing individuals and instead reacted by cutting the “less sensitive” services such as subsidies to others. If this is the case, we might be worried that the estimated effects of the grant reform are effects of this budget squeeze rather than of the form the grants arrived in. One way of investigating this is by studying municipal employment. In Fig. 4, we graph the change in employment for all years except 1988 and
1992 (we exclude 1988 because of lack of data and 1992 since this is the year for the care-for-elderly reform\textsuperscript{21}). If there were any downward rigidity in changes in employment, we would expect the distribution in the figure to be skewed to the right. As can be seen from the figure, data does not display any such pattern, lending support to our interpretation of the empirical findings.

Looking finally at the socio-economic variables in \( z \), we find that the share of inhabitants older than 79 years (OLD), the share most likely to need elderly care, enters positively both before and after 1992, when the responsibility for elderly care was transferred from the county level to the municipal level. As expected, its impact is larger, as well as significant at a higher statistical level, after the reform. Somewhat surprising is the finding that the share of inhabitants younger than 16 years of age enters with a negative sign, yet insignificantly so (in a statistical sense). However, the same variable lagged one period enters positively and is significantly different from zero. A possible explanation for the latter result is that newborn children do not affect the demand for municipal spending before they start attending day care (see the discussion in footnote 17). The political variable is positive, which is in line with our prior expectation, but not significantly different from zero.

5.2. 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 pattern. It has, for example, been argued that “small” municipalities behave differently from “large” municipalities (see, e.g., Holtz-Eakin

\textsuperscript{21} Because of this reform, only 19 municipalities decreased employment between 1991 and 1992.
and Rosen, 1991; Borge and 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 subsamples, first according to size and then according to political majority.

5.2.1. 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 define small municipalities as municipalities having a population of less than 15,000 for all years 1988–1995 and large municipalities as municipalities having a population of more than 20,000 for the same time period. This leaves us with 103 small and 94 large municipalities.

The results are given in Table 2. Looking at the specification tests, we cannot reject that the models are correctly specified. From Table 4, we see that the finding in the full sample above, i.e. that the grant elasticity was higher with targeted 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. Small municipalities also have lower wage elasticity and higher median income elasticity than large municipalities. They hence react more to income changes and less to wage changes. Furthermore, looking at Table 2, we find indications that the adjustment process is slower

<table>
<thead>
<tr>
<th>Variable</th>
<th>Small municipalities</th>
<th>Large municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GMM1</td>
<td>GMM2</td>
</tr>
<tr>
<td>EMPLOY(1)</td>
<td>0.5608</td>
<td>5.1102</td>
</tr>
<tr>
<td>MEDIAN</td>
<td>0.1340</td>
<td>2.2187</td>
</tr>
<tr>
<td>GRANT_92</td>
<td>0.3610</td>
<td>1.9372</td>
</tr>
<tr>
<td>GRANT93_</td>
<td>-0.0278</td>
<td>-0.1921</td>
</tr>
<tr>
<td>PRICE</td>
<td>-0.0918</td>
<td>-1.4472</td>
</tr>
<tr>
<td>YOUNG</td>
<td>-0.3800</td>
<td>-1.9912</td>
</tr>
<tr>
<td>YOUNG(1)</td>
<td>0.2640</td>
<td>1.2451</td>
</tr>
<tr>
<td>OLD_91</td>
<td>0.3800</td>
<td>0.0396</td>
</tr>
<tr>
<td>OLD92</td>
<td>1.2000</td>
<td>1.2073</td>
</tr>
<tr>
<td>SOCIALIST</td>
<td>0.1140</td>
<td>0.1929</td>
</tr>
</tbody>
</table>

Test | p-value | Test | p-value |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sargan (1)</td>
<td>0.321</td>
<td>Sargan (1)</td>
<td>0.000</td>
</tr>
<tr>
<td>Sargan (2)</td>
<td>0.074</td>
<td>Sargan (2)</td>
<td>0.556</td>
</tr>
<tr>
<td>AR(1)</td>
<td>-4.8207</td>
<td>0.000</td>
<td>AR(1)</td>
</tr>
<tr>
<td>AR(2)</td>
<td>-0.8815</td>
<td>0.189</td>
<td>AR(2)</td>
</tr>
<tr>
<td>AR(3)</td>
<td>-1.1027</td>
<td>0.135</td>
<td>AR(3)</td>
</tr>
<tr>
<td>AR(4)</td>
<td>1.1764</td>
<td>0.120</td>
<td>AR(4)</td>
</tr>
</tbody>
</table>

(i) The set of instruments includes INCOME, YOUNG, YOUNG(1) and SOCIALIST 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 1.
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.

5.2.2. 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.

The results are given in Table 3. In Table 4 (elasticities), we see that the grant elasticity is still higher before the reform than after for both political municipality types. 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.

### Table 3

Sample split over conservative and socialist municipalities

<table>
<thead>
<tr>
<th>Variable</th>
<th>Socialist municipalities</th>
<th>Conservative municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GMM1</td>
<td>GMM2</td>
</tr>
<tr>
<td></td>
<td>Coeff.</td>
<td>t-ratio</td>
</tr>
<tr>
<td>EMPL(−1)</td>
<td>0.5813</td>
<td>5.6603</td>
</tr>
<tr>
<td>MEDIAN</td>
<td>0.0324</td>
<td>0.4653</td>
</tr>
<tr>
<td>GRANT_92</td>
<td>0.5144</td>
<td>2.8745</td>
</tr>
<tr>
<td>GRANT93_</td>
<td>0.0584</td>
<td>0.3353</td>
</tr>
<tr>
<td>PRICE</td>
<td>−0.0594</td>
<td>−0.7536</td>
</tr>
<tr>
<td>YOUNG</td>
<td>0.2282</td>
<td>0.9100</td>
</tr>
<tr>
<td>YOUNG(−1)</td>
<td>0.2305</td>
<td>0.9520</td>
</tr>
<tr>
<td>OLD_91</td>
<td>0.0890</td>
<td>0.1196</td>
</tr>
<tr>
<td>OLD92_</td>
<td>1.7350</td>
<td>2.1546</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>p-value</th>
<th>Test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sargan(1)</td>
<td>0.042</td>
<td>Sargan(1)</td>
<td>0.000</td>
</tr>
<tr>
<td>Sargan(2)</td>
<td>0.405</td>
<td>Sargan(2)</td>
<td>0.335</td>
</tr>
<tr>
<td>AR(1)</td>
<td>−4.9344</td>
<td>0.000</td>
<td>AR(1)</td>
</tr>
<tr>
<td>AR(2)</td>
<td>−2.0061</td>
<td>0.023</td>
<td>AR(2)</td>
</tr>
<tr>
<td>AR(3)</td>
<td>0.3906</td>
<td>0.348</td>
<td>AR(3)</td>
</tr>
<tr>
<td>AR(4)</td>
<td>0.1366</td>
<td>0.446</td>
<td>AR(4)</td>
</tr>
</tbody>
</table>

(i) The set of instruments includes INCOME, YOUNG, YOUNG(−1) and SOCIALIST 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 1.

22 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.
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. One possible explanation for this might be that socialist municipalities are less prone than conservative ones to increase their labour force when they get more freedom over their grants.

We also find that the adjustment process is significantly slower in socialist municipalities \((\lambda = 0.42)\) than in conservative municipalities \((\lambda = 0.57)\). Noteworthy is finally that median income is insignificant for socialist municipalities and that both the median income elasticity and the wage elasticity are significantly lower in socialist municipalities than in conservative ones. One possible explanation for this might be that socialist municipalities are more reluctant to fire employees than conservative municipalities. Taken together with the results for grants, the estimates hence indicate that socialist municipalities are less prone than conservative ones to alter the number of persons employed by them.

6. Summary and concluding remarks

Studies investigating municipal labour demand 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 1988–1995, 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 find that irrespective of in which form intergovernmental grants arrive, they have quite small effects on the municipal employment, at least for the investigated period: a 1% increase in intergovernmental grants only lead to 0.1% increase in municipal employment in the long run. This would imply that the central government’s possibilities to influence local governments’ employment decisions are rather small. Having in mind that intergovernmental grants only make up 20% of the budget of the municipalities might

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Elasticities (standard errors)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All municipalities</td>
</tr>
<tr>
<td>Short run elasticities</td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>0.533 (0.0782)</td>
</tr>
<tr>
<td>Grant: Pre reform</td>
<td>0.060 (0.0113)</td>
</tr>
<tr>
<td>Grant: Post reform</td>
<td>0.025 (0.0096)</td>
</tr>
<tr>
<td>Median income</td>
<td>0.369 (0.0667)</td>
</tr>
</tbody>
</table>

| Long run elasticities |                |                    |                      |                          |                            |
| Wage | -0.896 (0.1789) | -0.946 (0.1338) | -0.518 (0.1318) | -0.300 (0.0987) | -0.540 (0.0837) |
| 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) |
| Median income | 0.620 (0.1501) | 0.443 (0.1101) | 0.575 (0.1393) | 0.124 (0.0803) | 0.337 (0.0675) |

Elasticities and their standard errors have been obtained using second step estimates applying the delta-method.
be part of the explanation for this rather small impact of central funding. Remember however that the studied period is one where the Swedish economy was in a recession and where several local governments were wrestling financial problems. It would therefore be interesting to investigate municipal labour demand in a period with a stronger economy.

We further find that intergovernmental grants affected municipal labour demand more before the reform than after. This pattern is specifically strong for socialist local governments. Using the whole sample, we estimate the short run (long run) elasticities to 0.06 (0.1) before the reform and to 0.0025 (0.042) after the reform. General grants thus seem to have less employment effects than targeted ones. The policy implication from this is that if the central government wants to increase municipal labour demand using grants, it ought to use targeted rather than general grants.

We further find a short run wage elasticity of approximately $-0.5\%$ and a long run ditto of approximately $-0.9\%$, and a quite sluggish adjustment process: only $60\%$ of the desired change in municipal employment is implemented in the first year.

In this paper, we have studied total municipal employment. It goes without saying that the wage, grant, and income variables 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.

Acknowledgements

We are grateful for helpful comments from Seung Ahn, Sören Blomquist, Richard Blundell, Anders Forslund, Peter Fredriksson, Bertil Holmlund, Jørn Rattsø, and three anonymous referees, as well as seminar participants in Göteborg, Trondheim and at FIEF and IFAU. We are also grateful to Peter Fredriksson, Gunnar Forsling and Per Pettersson for providing us with variables for the data set. Any remaining errors are ours. Matz Dahlberg gratefully acknowledges financial support from HSFR.

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 as regressors 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?).

*Real median income.* Median yearly household income in the municipality deflated by CPI. The population consists of inhabitants older than 20 years. Source: For the first 3 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 and Fredriksson, 2000 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.

*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.

*Tax price.* Real median income/Real average income.

*Real grants.* Targeted and general grants received from central authorities deflated by CPI. Expressed as SEK per inhabitant. Source: Yearbook for Swedish Municipalities.

*Income.* Real median income + Tax price*Real grants.

*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?).

*Price.* Tax price*Real wages.

*Young.* Share of inhabitants younger than 16 years of age. Source: Yearbook for Swedish Municipalities.

*Old.* Share of inhabitants older than 79 years of age. Source: Yearbook for Swedish Municipalities.

*Socialist.* 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 0 otherwise. Source: Yearbook for Swedish Municipalities.

Table A1. Summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.0613396</td>
<td>0.0086193</td>
<td>0.0379</td>
<td>0.091</td>
</tr>
<tr>
<td>Between</td>
<td>0.0066389</td>
<td>0.0449875</td>
<td>0.0784375</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>0.0055112</td>
<td>0.0408396</td>
<td>0.0791771</td>
<td></td>
</tr>
<tr>
<td>Real median income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>150523.5</td>
<td>20435.68</td>
<td>98700</td>
<td>220050</td>
</tr>
<tr>
<td>Between</td>
<td>14467.35</td>
<td>114901.8</td>
<td>202082.6</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>14458.93</td>
<td>99382.99</td>
<td>183081.4</td>
<td></td>
</tr>
<tr>
<td>Real average income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>178169.9</td>
<td>28475.33</td>
<td>114800</td>
<td>321700</td>
</tr>
<tr>
<td>Between</td>
<td>22078.08</td>
<td>135601</td>
<td>298643.9</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>18031.76</td>
<td>125555.4</td>
<td>256733.1</td>
<td></td>
</tr>
</tbody>
</table>
The overall and within calculations use 245 × 1960 observations. The between calculations use 245 observations. A variable $x_{it}$ is decomposed into a between ($\bar{x}$) component and a within ($\bar{x}_i$), where $\bar{x}$ denotes the overall mean, component.

### References


