SPENDING GROWTH WITH VERTICAL FISCAL IMBALANCE: DECENTRALIZED GOVERNMENT SPENDING IN NORWAY 1880-1990

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Abstract

Vertical fiscal imbalance, decentralized responsibility of spending with centralized financing, creates a common pool problem with spending pressure towards central funds. A model of decentralized government spending under vertical fiscal imbalance is developed, and the importance of national political characteristics for internalization of costs and spending level is investigated in an econometric analysis of Norway during 1880-1990. We argue that in a parliamentary democracy, the internalization of costs is influenced by the party fragmentation of parliament. This is confirmed by the econometric analysis using a Herfindahl index as a measure of fragmentation and political strength.

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1. INTRODUCTION

Vertical fiscal imbalance, decentralized responsibility of spending with centralized financing, is of particular importance in the Scandinavian welfare states. The welfare services are decentralized to the local public sector, but financing and controls are arranged by the central government to secure equalization of service levels. Fiscal imbalance is relevant in most countries, since decentralized government typically is partly financed by grants. In this case, benefits are enjoyed at the local level, but are at least partly financed from a common pool of national resources. The common pool problem typically implies a spending pressure towards central funds and also possibly strategic behavior to induce bailout. In the case of Norway, the central government generally has held a hard budget constraint, but the political system has struggled to hold back the spending pressure. The present paper investigates characteristics of the political structure important in controlling decentralized government spending. It contributes to the recent literature on the design of fiscal federalism [see overview of Oates (1999)].

The essence of the common pool problem is that the perceived costs of public services at the district level are lower than the actual costs. The districts consequently impose negative externalities on each other. The ability to internalize these externalities depends on the autonomy of national political institutions. This understanding of overspending bias was suggested by Weingast, Shepsle and Johnsen (1981) in the context of the US Congress. Inman (1988) and Inman and Fitts (1990), analyzing federal grants and federal spending in the US, represent the first econometric studies of the universalistic model. They show the importance of majority-rule leadership in Congress and strong president to set the agenda and coordinate the national interests. In this paper we generalize the Inman-Fitts model to the case of parliamentary government where the voters set the stage for the national decision making through the election of representatives from multiple parties to the parliament. The party fragmentation of the parliament seems to us the main determinant of the political strength to internalize costs and thereby contribute to a socially efficient allocation in this system. At the next level, the composition of the parliament forms the basis of constituting governments. Characteristics of the government also are included in the empirical study of decentralized spending in Norway 1880-1990.

During the period under study vertical fiscal imbalances have increased as the system of financing local governments gradually has become more centralized. In Norway the

centralization process is not only characterized by an increased share of grants in total local revenue, but also by national regulation of local taxes. The tax laws of 1882 introduced a compulsory local income tax, and already in 1911 the national parliament voted in favor of tax limits. Grant financing increased sharply during the 1930's, reflecting the clean up of the local government debt crisis (due to deflation and economic contraction in the 1920's) and the introduction of equalization grants. After WWII local governments became an important tool in the building of the welfare state, and more centralized financing was motivated by a desire to secure equal provision of welfare services throughout the country. Compared to most other countries, Norway developed an extremely centralized system of financing with effective tax limits and a high share of grant financing. Since 1970, grants and regulated taxes have generated 85-95% of total local government revenue.

During the period of centralized financing and increasing vertical fiscal imbalances, decentralized government has been the fastest growing part of the Norwegian public sector. Table 1 shows how its share of GDP has expanded from about 3% in 1880 to about 17% in 1990. The local expenditure growth has been higher than the GDP growth during all decades. Since WWII the fluctuations of GDP growth have been reflected in the local expenditure growth.

Table 1 about here

The conventional starting point for the understanding of government spending is the demand model of public services. Wagner's (1883) law relates the expansion of the public sector to general income growth, whereas Baumol's (1967) disease focuses on rising costs combined with price inelastic demand for public services. Some suggestive evidence regarding Wagner's law and Baumol's disease can be read from Table 1. The rising share of the local public sector is consistent with Wagner's law, but other background factors may explain the trend. Baumol (1967) emphasizes limited potential for productivity growth in the public sector. Interestingly, the relative price of local public services (to the GDP index) starts increasing only in the late 1950's. It follows that the Baumol effect may contribute to the explanation of the expenditure growth first and for all during the 1960's and the 1970's.

The political and economic modeling of the decision making process is described in section 2. The empirical formulation of the model is discussed in sections 3 and 4, followed by the analysis and main findings in sections 5 and 6. Finally, section 7 concludes.

2. MODELING VERTICAL FISCAL IMBALANCE

The purpose of our modeling strategy is to integrate economic and political factors determining the spending of decentralized government under vertical fiscal imbalance. The role of economic factors is well understood in the standard demand approach emphasizing price, income and congestion effects. The expansion of the local public sector is related to the development of the overall income level and the costs of local public services. Inman (1979) summarizes the evidence of demand studies, basically based on cross-sectional data of local governments. Borcherding (1985) started the application of this framework to the analysis of public sector growth. As argued by Mueller (1987), economic factors alone cannot explain much of the growth of government.

The demand model can be applied to explain the incentive problems that appear under centralized financing. The services offered by the local public sector supply benefits to specific geographic areas, here called districts. While the benefits are concentrated, the financing is shared through central government taxation distributed out as grants. The benefits are fully internalized in each district, but only a share of the costs is carried. We look at a representative individual in a homogenous district. The individual has a utility function defined over private consumption and individual consumption of local public services. The utility function is maximized given the individual income, a budget constraint covering the two goods, and a fixed level of local public spending in other districts. The demand function can be specified as follows:

$$Q = AP^{\eta}Y^{\varepsilon} \tag{1}$$

The individual's desired consumption of local public services (Q) depends on the perceived cost (P) of increased service provision and per capita income (Y) in the district. The parameters η and ε are the price and income elasticities of local public services respectively. In each district the individual consumption is related to local public production per capita (X) and the local population size (N) by:

$$Q = XN^{1-\gamma} \tag{2}$$

The congestion parameter γ measures the degree of publicness of local public services. Local public services are pure public goods when γ=0. On the other hand, when γ=1, they are private goods. Combining (1) and (2), we get the conventional demand function estimated in a voluminous literature on public spending:

$$X = AP^{\eta}Y^{\varepsilon}N^{\gamma-1} \tag{3}$$

The demand for local public services is determined by price, income level, and population size. Vertical fiscal imbalance and the common pool problem are best interpreted as influencing the price variable. We define the price as the cost of raising the consumption of the local public service Q to all local residents taking into account the size of the population sharing the financing. Under decentralized financing, when the local residents share the costs of the public service, the price is

$$P = \frac{CX}{Q} = CN^{\gamma-1} \tag{4}$$

where C is the unit cost of local public production (X). The price equals C/N when local public services are pure public goods and C when they are private goods. By substituting (4) into the demand function (3), we get:

$$X = AC^{\eta}Y^{\varepsilon}N^{\mu} \quad \mu = (\gamma-1)(\eta+1) \tag{5}$$

In a decentralized system of financing where each district is responsible for providing the local public service and where voters are equal, X from equation (5) is socially efficient. Moreover, when all districts are equal, the national average of local public service production (G) can be written as

$$G_S = A_1C^{\eta}Y^{\varepsilon}M^{\mu} \quad A_1 = AD^{-\mu} \tag{6}$$

where M is the national population size and D the number of districts. As X from equation (5), G_S is socially efficient. This benchmark demand model allows for the testing of the Baumol effect

and Wagner's law. The cost problem of Baumol's disease works to increase local public spending per capita (CG) if the demand is price-inelastic (η>-1). According to Wagner (1883), the relative size of government increases as a country grows richer. Consequently, Wagner's law implies income-elastic demand (ε>1). In general per capita service production will depend on the population size. The higher the population size, the lower is the per capita cost of public consumption. Hence, per capita public spending increases as the population grows if demand is price-elastic and decreases if demand is price-inelastic. Notice that the congestion parameter cannot be identified when η=-1. Then μ=0 whatever the value of γ.

The benchmark economic demand model with socially efficient allocation assumes benefit taxation. When this kind of benefit taxation is not implemented, spending is separated from financing and an aggregate decision problem about the provision of local public services emerges. We will use as a reference point the case where each district's spending is financed out of a common pool of national tax revenues. This is an extreme version of centralized financing of decentralized spending. As shown by Persson and Tabellini (1999, section 9), the common pool problem can be described as the situation where each district sets the local service production given this shared tax financing and with the tax rate determined residually. In our setting, the price variable is changed when under centralized financing the national population M shares the financing of decentralized spending. Now the price is the cost of raising the consumption of the local public service Q to all N residents taking into account that the national population M share the costs:[1]

$$P = \frac{N}{M}\frac{CX}{Q} = \frac{1}{D}CN^{\gamma-1} \tag{7}$$

In this case aggregate per capita demand of the local public service is given by:

$$G_U = A_1(\frac{C}{D})^{\eta} Y^{\varepsilon} M^{\mu} \tag{8}$$

The important point is that each district will only take into account its share 1/D of the unit cost C of local service production. The centralized financing of local governments drives a wedge

[1] The formulation assumes that national taxes are equally shared among the D districts.

between the real cost of increased service provision and the perceived cost. We refer to the resulting 'overspending' as the universalistic solution G_U as it relates to the universalism theory of collective behavior in a national legislature by Weingast (1979). Weingast, Shepsle and Johnsen (1981) have developed the understanding of the common pool problem assuming that 'geography is the hallmark of distributive politics'. The idea is that the districts are all represented in a national legislature. Under a 'norm of universalism' all representatives are members of the winning coalition, and more specifically each representative agrees to support the preferred allocation of all other representatives. The norm is a result of a fundamental uncertainty facing the representatives. Will they be in, or out, of the winning coalition? The uncertainty is removed under the norm of universalism. Compared to a winning coalition that includes less than all representatives, the benefit to each member of the coalition is reduced. However, a small but certain benefit may be preferred to a larger but uncertain benefit.

Weingast and associates have not developed a full political equilibrium, and recent theoretical research has addressed the decision making within legislature when projects with concentrated benefits are financed by universal taxation [see Chari and Cole (1995) and Persson and Tabellini (1999)]. On the empirical side, Inman (1988) is the innovative study of the political economy of US federal grants in this setting, followed up by an analysis of US fiscal policy in Inman and Fitts (1990). Baqir (1999) investigates institutional differences of city governments in the US. The broad question is how the national political system handles the spending pressure resulting from limited internalization of the costs of decentralized government. Parliamentary government unfortunately is more complex than the US setting with district representatives. Persson et al. (1997) spell out the differences between parliamentary versus presidential-congressional systems. They argue that legislative cohesion between parties and coalition politics are important characteristics of parliamentary government. This is consistent with the growing empirical literature of the effects of political structure and political fragmentation in the OECD countries started up by Roubini and Sachs (1989a,b). Alesina and Perotti (1995) summarize the fiscal consequences of a variety of aspects of the political system in OECD countries and confirm this understanding.

Norway is a multi-party parliamentary system with proportional representation from 19 districts, and where the political parties run on a national campaign. In this institutional context, the parties will to some extent internalize the costs of decentralized spending, thereby limiting universalistic behavior and the negative consequences of centralized financing and

vertical fiscal imbalances. But since the parties have their strongholds in different regions and have different marginal districts, they will not agree about the geographical distribution of funds. What is the outcome of the parliamentary decision making process? We argue that the party composition of the parliament is the crucial determinant of political strength to hold back the spending pressure. When the parliament is fragmented with many small parties, a norm of 'party-universalism' with high spending in (almost) all districts may develop. On the other hand, a majority party does not need to bargain with other parties in parliament in order to implement its desired policy. Party fragmentation affects the degree of internalization of social costs. We introduce a parameter θ to measure the degree of internalization of the costs, and generalize Inman and Fitts (1990) by allowing politics to enter the price term:

$$P = \theta C N^{1-\gamma} \qquad \frac{1}{D} \leq \theta \leq 1 \tag{9}$$

Technically the degree of internalization measures what share of the total number of districts is taken into account when the decentralized spending level is determined. When $\theta = 1$, all social costs are fully internalized. At the other extreme when $\theta = 1/D$, the demand reflects the extreme overspending of universalism. In the general case, decentralized government service provision is given by:

$$G = A_1 C^{\eta} Y^{\varepsilon} M^{\mu} \theta^{\eta} \tag{10}$$

It follows that the size of the decentralized government varies inversely with the θ parameter, and the degree of internalization reflects the ability of political institutions to coordinate the national interest. We will use a Herfindahl index (*HERF*) measuring the party fragmentation of the parliament as our primary indicator of political strength. The party composition of the parliament is determined by elections, and can be seen as exogenous relative to the limited issue of decentralized spending. A fragmented parliament is less able to internalize the externalities. In addition, two alternative indicators describing the political system, the type and duration of government, will be investigated in the empirical analysis. They refer to a classification of governments with respect to majority/minority and one party/coalition (*GOV*) and the duration of government (*DUR*). Section 3 documents the three measures of national politics. The factors assumed to influence the degree of internalization can be summarized in the following equation:

$$\theta = \theta(HERF, GOV, DUR) \tag{11}$$

The integrated political economy model will be applied to understand the expansion of the local public sector over a hundred year period. In addition to the political structure discussed above, we will include the ideological orientation of the population. The size of the public sector has been a key issue in the ideological controversy between socialists and conservatives and the ideological orientation of the population has varied over time. In our setting this can be understood by separating only between a socialist and a conservative majority view. In this case, the ideological orientation affects both the universalistic and the socially optimal solution. Using *SOC* and *CON* as descriptions of socialist and conservative majorities, respectively, we can describe four alternative aggregate levels of decentralized government services representing social efficiency and universalism along a line (with *G* rising towards the right):

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G_S^{CON} G_S^{SOC} G_U^{CON} G_U^{SOC}

The model assumes that the population as voters must take two aspects of the election choice into account. A socialist vote will contribute to higher desired decentralized spending. But the vote also will influence the party fragmentation of the parliament and thereby the ability to internalize the costs. We will show below that there has been a tradeoff between ideological orientation and political strength in the national politics in Norway during the period studied.

3. DATA

The empirical analysis relates the local public spending (described in section 1) to characteristics of political strength assumed to be important for the internalization of social costs. Our primary measure of political strength is a Herfindahl index of the party fragmentation of the parliament (*HERF*). When SH_p is the share of the seats held by party *p*, the index is calculated as follows:

$$HERF = \sum_{p=1}^{P} SH_p^2 \tag{12}$$

The index is inversely related to fragmentation. It takes the maximum value of 1 when a single party holds all the seats and the minimum value of 1/*P* when the seats are equally divided among the *P* parties. Table 2 shows that the party fragmentation of the parliament increased steadily from the 1880's to the 1920's, and has been quite stable since WWII.

In addition to the Herfindahl index, we investigate two alternative indicators capturing characteristics of the government and that have been used in the literature. The first is a classification of government types according to minority/majority and one party/coalition:

1 - Minority coalition
2 - One party minority
3 - Majority coalition
4 - One party majority

The classification is similar to the one adopted by Roubini and Sachs (1989a,b), except that it is of interest to separate between one party and coalition minorities in our case. In the econometric analysis we use a dummy formulation of this variable as suggested by Edin and Ohlsson (1991). The average index value (*GOV*) for each decade is shown in Table 2. The 1880's and the social democratic golden age (1945-1961) are controlled by a one party majority government, an index value of 4. During the 1920's and since 1972 basically minority governments have operated (index value of 2 and below), maybe when a strong government was most needed.

Table 2 about here

The second characterization of the government is duration, which reflects survival and therefore strength. The average duration in terms of months (*DUR*) is reported in Table 2. The post-WWII period up through the mid-1960's reflects the social democratic dominance. Compared to most countries, Norway has had stable governments lasting on average several years.

The relationships between the three measures of political strength are spelled out in Table 3. It is no surprise that the strongest correlation is found between *HERF* and *GOV*. In a multi-party parliamentary system a fragmented parliament is more likely to produce coalition and/or minority governments. This is obvious by looking at the extreme values. When *HERF*=1, a one

party majority government is the only option. On the other hand, when *HERF*=1/*P* and *P*>2, the only options are a majority coalition or a minority government. The correlation between *DUR* and *GOV* is also quite strong, whereas *DUR* and *HERF* are practically uncorrelated. However, if we regress *DUR* on both *HERF* and *GOV*, they are both highly significant. This is consistent with the findings of political scientists in the 1970's [e.g. Taylor and Herman (1971), Warwick (1979)] who documented that duration of government is related to party fragmentation and type of government.

Table 3 about here

Decentralized government spending is influenced by other variables than those discussed so far, and they are included as controls affecting the constant term in the demand function. First, there is an underlying demand for local public services that changes with demographics. Since most local services are related to specific age groups, the demand relates to the development of these age groups, notably the young (child care, primary education) and the old (care for the elderly). The effect of demographic factors on local public resource use is documented by Borge and Rattsø (1995). Table 2 shows clear trends, the decline of the share of youth (below 14 years of age, denoted *YO*) and the rising share of elderly (above 67 years of age, denoted *EL*). The 'wave of the elderly' is well known in the public debate and relates to the dramatic shift in the age composition during the late 1970's and the 1980's.

Second, the preferences for local public spending also must be seen in the context of macroeconomic policy. Active stabilization policy has been carried out in a Keynesian fashion, at least in the late 1930's and the post WWII period up to about 1980. Government spending, including spending at the local level, has been adjusted to counterbalance business cycles. The macroeconomic situation is represented by the inflation rate (*Π*). In a small open economy as the Norwegian, a current account deficit may reduce the ability to increase spending in recessions. This is the motivation for including the current account surplus as share of GDP (*CA*) as an additional macroeconomic indicator.

4. ECONOMETRIC FORMULATION

The integrated economic and political model of decentralized government spending consists of the demand function (10) extended by political strength, ideology, the business cycle, and the age composition of the population. The empirical analysis applies a dynamic version of a logarithmic transformation of the extended demand function:

$$g = \beta_0 + \sum_{j=1}^{2} \beta_j g(-j) + \sum_{j=0}^{2} \eta_j c(-j) + \sum_{j=0}^{2} \varepsilon_j y(-j) + \sum_{j=0}^{2} \mu_j m(-j) + \sum_{j=0}^{2} \phi_j Z(-j) + u \qquad (13)$$

Small letters indicate logarithmic transformations of the original variables and (*-j*) that the variable is lagged *j* years. The variables capturing political strength, ideology, the business cycle and the age composition of the population are included in the vector *Z*. With this formulation the long run price and income elasticities are given by:

$$\eta = \frac{\sum_{j=0}^{2} \eta_j}{1 - \beta_1 - \beta_2} \qquad (14)$$

$$\varepsilon = \frac{\sum_{j=0}^{2} \varepsilon_j}{1 - \beta_1 - \beta_2} \qquad (15)$$

Table 1 shows that decentralized public spending has increased steadily during the period under study. It is clearly non-stationary. The time series properties of real spending per capita (*G*), relative price (*P*) and GDP per capita (*Y*) are checked by performing augmented Dickey-Fuller tests. An augmented DF test is a test on the parameter λ_1 in equation (16). The variable *w* is non-stationary if λ_1 equals zero and is stationary if λ_1 is negative. The test-statistic is the usual *t*-statistic of λ_1, but it must be taken into account that it does not follow a standard *t* distribution. We started out by allowing for 10 lags in the dependent variable (*J*=10). The last lag was deleted if insignificant, and the test was performed using the first equation with a significant last lag.

$$\Delta w = \lambda_0 + \lambda_1 w(-1) + \sum_{j=1}^{J} \delta_j \Delta w(-j) + v \qquad (16)$$

Table 4 about here

The results of the tests are reported in Table 4. It appears that the null hypothesis of non-stationarity cannot be rejected for neither local public spending per capita, relative price nor GDP per capita.[2] For the growth rates of the same variables, however, the null is clearly rejected. Hence, local spending per capita, relative price and GDP per capita are I(1) or integrated of the first order, while their growth rates are stationary or I(0). The presence of a unit-root in the relative price of local public services points to the possibility of a Baumol's cost disease.

It is convenient to rewrite equation (13) such that the dependent variable is stationary. Without imposing any restrictions this can be done as follows:

$$\Delta g = \beta_0 + (\beta_1 - 1)\Delta g(-1) + (\beta_1 + \beta_2 - 1)g(-2) + \sum_{j=0}^{2}\eta_j c(-j) + \sum_{j=0}^{2}\varepsilon_j y(-j) + \sum_{j=0}^{2}\mu_j m(-j) + \sum_{j=0}^{2}\phi_j Z(-j) + u \tag{17}$$

The left hand-side of (17) is stationary. Then the equation is balanced if and only if the structural part of the right hand-side is I(0). Several of the explanatory variables are I(1), among these are $p(-j)$, $y(-j)$ and $g(-2)$. Hence, the structural part of the right hand side is stationary only if the I(1) variables form a cointegrating vector. This issue will be checked by performing an Engle-Granger cointegration test on the I(1) variables (see section 5).

The empirical analysis is based on a long time series data set. The estimation period is 1884-1990 excluding the years of WWII (1940-45). Since inflation data after WWII only are available from 1947 and the model includes two years lag of all variables, 1949 is the first year after WWII that can be utilized for estimation. For each equation estimated we have used the maximum number of observations available, and, as the observant reader will see, this implies that the estimation period varies somewhat across the equations estimated. The reasons are that two of the indicators of political strength (*GOV* and *DUR*) only are available from 1884 (whereas

[2] The tests are performed on the log of the variables. Moreover, spending data for 1959 and later years are not comparable to those of earlier years. To capture this shift we constructed a dummy variable ($D59$) that equals 1 in 1959 and later years. $D59$ as well as $\Delta D59$ are included in all equations that include local public spending. The results, however, are similar when these dummy variables are excluded.

HERF is available from 1882) and that 1948 can be utilized when inflation is captured by the change in the inflation rate (as in the equations reported in Tables 5-7).

5. ANALYSIS: ECONOMIC DETERMINANTS

We start out by estimating equation (17) by ordinary least squares. Besides our primary indicator of political strength (*HERF*), the *Z* vector comprises the inflation rate (*IT*), the current account surplus as share of GDP (*CA*), the share of youth (*YO*), the share of elderly (*EL*) and the share of socialists in the parliament (*SOC*). The results are reported in the appendix Table A1. With this equation as a point of departure, we tried to find a more parsimonious model with significant coefficients of expected signs.

The parsimonious model is reported in Table 5, equation A. The restrictions imposed by the parsimonious model can be tested by a regular *F*-test. With a test value of 0.95 and a p-value of 0.54 the restrictions cannot be rejected at conventional levels of significance.[3] The variables within the brackets are I(1), whereas the other variables on the right hand side are stationary. An Engle-Granger cointegration test indicates that the variables within the brackets (*g*, *y*, *p* and *SOC*) are cointegrated. The test value is -3.89 with critical values of -4.21 (5%) and -3.89 (10%).[4] The null hypothesis of no cointegration is rejected at the 10% level, and, consequently, the equation is balanced.

Since the time series cover more than 100 years, it is important to test for structural breaks. This can be implemented as a standard F-test (Chow test) of parameter stability. Since the financing of Norwegian local governments has become more centralized after WWII (see section 1), it is natural to test whether the parameters are stable across the pre and post WWII periods. The test statistic reported in Table 5 shows that the null hypothesis of stable parameters before and after WWII cannot be rejected at conventional levels of significance. In addition, we tested for structural breaks associated with a change in data definition in 1959. In all equations estimated

[3] The test statistic follows an F distribution with (23,66) d.f.
[4] Although *SOC* is restricted to be between 0 and 1, it is clearly non-stationary in our sample. A regular Dickey-Fuller test gives a test-statistic of -1.46 with a p-value of 0.58. The test was performed with election period as unit of observation.

this shift is captured by shifts in the constant term (see footnote 2). The reported *F*-test shows that this is sufficient in order to capture the change in data definition.

Because autocorrelated error terms may violate testing and cause biased coefficients in models with lagged dependent variables, it is important to test for autocorrelation. The diagnostics reported in Table 5 reveal some signs (10% level) of second and third order autocorrelation in equation A. In order to investigate whether this really is a problem, we have reestimated the model using an instrument for the lagged dependent variable. Since there is no sign of fourth order autocorrelation, $g(-4)$ can be used as instrument for $g(-2)$. It appears that the IV estimates reported in equation B are very similar to the OLS estimates, indicating that autocorrelation has not biased the coefficients in equation A. Consequently, we choose not to instrument the lagged dependent variable in the regressions presented in the following.

Table 5 about here

As an overall evaluation of the dynamics, the macroeconomic situation seems to be the most important factor explaining the short run fluctuations in decentralized government spending. In the long run, both benchmark demand variables and political factors play a prominent role.

Macroeconomic booms, described by increasing inflation, have a negative and significant impact on the growth of the local public sector. This is consistent with the view that the central government uses the local public sector as part of a Keynesian-type stabilization policy. Henrekson (1988) and Roubini and Sachs (1989a) document similar effects of the business cycle using unemployment as a macroeconomic indicator. The quantitative effect can be illustrated as follows: An increase in the inflation rate by one percentage point decreases the spending growth by 0.4-0.5 percentage points. The current account deficit has no significant impact.

The benchmark demand variables, relative price and GDP per capita, come out significant and with the expected sign. The support for Wagner's law is strong. The estimated long run income elasticity is around 1.4, and it is significantly larger than 1.[5] Henrekson (1993) surveys the literature on Wagner's law. He argues that earlier support for the law may be due to spurious correlation among variables that grow over time. Using Swedish data, he finds that public

[5] The long run elasticities are non-linear functions of the estimated coefficients. The standard errors are calculated using the method discussed by Kmenta (1986, p. 485-491).

spending as share of GDP and GDP per capita are not cointegrated, i.e., the correlation between the two variables is spurious. In our case, however, the estimated equation is balanced, i.e., the I(1) variables on the right hand side form a cointegrating vector. Consequently, our support for Wagner's law is not due to spurious correlations. Oxley (1994) reaches the same conclusion as us using British data. Falch and Rattsø (1997) find a similar support of Wagner's law in school spending data for Norway. They discuss the contrast with estimates of income-elasticities based on cross section data. Time series analyses capture the development over time of the main cost component of public spending, compensation to public employees.

The estimated long run price-elasticity of 1.15 is significantly negative, but it is imprecisely estimated compared to the income-elasticity. The hypothesis η=-1 cannot be rejected. Hence, the Baumol cost disease is not important. Compared to cross section analyses, our estimates imply a more price-elastic demand for local public services. The growth accounting of Borcherding (1985) relies on cross section estimates, and he argues that an elasticity of -0.4 is representative.

The population size has no systematic impact on per capita spending. We tested the issue formally by expanding equation A in Table 5 with the log of the population size lagged up to two years. The F-statistic of 0.53 is not significant at the standard levels,[6] but the result is difficult to interpret in terms of the congestion parameter since the estimated price elasticity is close to -1.

According to the estimates, the age composition of the population has not contributed to the growth of local public spending. Neither the share of youth nor the share of elderly appears in the parsimonious equation. This is confirmed by similar tests as above, giving F-values of 0.15 and 0.12 respectively.[7] We find these results surprising, particularly because the variables are shown to be important in cross section analyses of Norwegian local governments [e.g. Borge and Rattsø (1995)]. However, the Dutch studies of Renaud and van Winden (1988, 1991) have similar patterns, i.e., the share of dependents (dependent on transfer payments from the government) comes out significant in cross section analyses, but not in time series analyses. Future research should look into the discrepancy between studies using cross section and time series data.

[6] The d.f. are (3,87) with critical values of 2.15 (10%) and 2.71 (5%).
[7] See footnote 6.

6. ANALYSIS: POLITICAL DETERMINANTS

The main objective of the analysis is to test whether political characteristics are important to understand the spending growth. Table 5 shows that the variables measuring both political strength and ideology are significant and with the expected signs. A more fragmented parliament clearly leads to higher spending growth. The quantitative impact is substantial. An increase in the Herfindahl index by one standard deviation increases spending by 10% in the long run, whereas the difference between the least and most fragmented parliament in the sample is 41%. If the share of socialist votes in the parliament increases by 20 percentage points, spending is expected to increase by 15% in the long run.

Alternative measures of political strength are investigated in Table 6. The point of departure is equation A in Table 5, and column A in Table 6 just reproduces the coefficients of the political variables of that equation.[8] The other columns in Table 6 use different indicators of political strength, but do otherwise include the same explanatory variables as equation A in Table 5.[9] In column B we study the impact of government type. The category one party majority is used as reference, and *GOV*1 is minority coalition, *GOV*2 one party majority, and *GOV*3 majority coalition. All three dummy variables come out with the expected positive sign, and spending seems to increase with the weakness of the government. This result is in contrast to the findings of Edin and Ohlsson (1991). Using OECD data they find the main difference to be between majority and minority governments. Our results suggest that, at least in the case of Norway, the number of parties in the government also affects political strength.

Table 6 about here

In column C we report the effect of duration of government. Again, the variable comes out significantly with the expected negative sign. Finally, when all three measures of political strength are included (column D), they all come out with the expected negative sign, but none of them are individually significant. This may reflect a problem of multicollinearity and confirms

[8] Table 6 reports the short run impact of the political variables, whereas the error correction formulation in Table 5 gives the long run impact of *SOC*. The coefficient reported in column A in Table 6 is the product of the long run coefficient in Table 5 (-0.747) and the speed of adjustment coefficient (-0.213).

[9] Only the coefficients of the political variables are reported since the impact of the non-political variables are robust to the specification of political strength. Complete estimation results are available upon request.

our understanding that they are alternative measures of strength. Their joint significance is confirmed by a regular F-test. The test statistic of 10.21, with (3,86) d.f., is significant at the 1% level.

Although the qualitative effect of political strength seems very robust as to how it is measured, the quantitative effect varies somewhat across the equations estimated. The predicted long run spending difference between the strongest and the weakest situation in the sample is 41%, 38% and 29% for the equations using *HERF*, *DUR* and *GOV* respectively. The estimated effect of political strength is similar to the results of Roubini and Sachs (1989), who find that a strong government is able to reduce spending by 32%. Inman and Fitts (1990) estimate the difference between a strong and weak president to be 9%. But since they also control for the party control in Congress, the total effect of federal political institutions may be comparable to our findings.

In addition to political strength, the ideological orientation of the legislature matters. In all equations the share of socialist votes in the parliament comes out significant and with the expected positive sign. A decline in the share of socialists from 60 to 40% reduces spending by respectively 15%, 23% and 31% depending on whether *HERF*, *GOV* or *DUR* are used as measures of government strength. Again, the quantitative effect differs somewhat across the measures of strength. In all cases, however, the estimated effect of ideology is much stronger than that of Henrekson (1988) and Roubini and Sachs (1989a).

In section 2 we argued that parties and government attempts at internalizing the costs of decentralized spending, and it is of interest to interpret the empirical findings in terms of the degree of internalization (θ). In order to estimate the degree of internalization we impose the following functional form:

$$\theta = \frac{1}{1+e^{\theta_0+\theta_1 POL}} \qquad POL = HERF, GOV, DUR \tag{18}$$

The chosen formulation restricts θ to take a value between 0 and 1 and imposes nonlinear restrictions among the parameters to be estimated. The following equation

$$\Delta g = \alpha_0 + \alpha_1 g(-2) + \alpha_2 \left[c(-2) + \log\left(\frac{1}{1+e^{\theta_0+\theta_1 POL(-2)}}\right) \right] + \alpha_3 y(-2) + \alpha_4 SOC(-2) + \alpha_5 \Delta\Pi + u \quad (19)$$

is then estimated using nonlinear least squares. Table 7 reports estimates of θ_0 and θ_1 in the cases where *HERF* and *DUR* are used as indicators of political strength. The model failed to converge when the dummy formulation of the type of government was applied. It appears that the two indicators of political strength are still significant (*HERF* only at the 10% level) and with the expected negative sign. When the Herfindahl index is applied, the degree of internalization is 85% on average during the sample period. It varies from 69% for the period with the most fragmented parliament, to 97% for the period with the least fragmented parliament. When we use duration of government as indicator of political strength, the degree of internalization and thereby the efficiency of the political system is slightly higher. Both measures indicate that the strongest political regime in the sample achieves 100% internalization of costs, whereas the weakest political regime is able to internalize only 50-70% of the costs.

Finally, it is of interest to compare the political regimes of the 1950's and the 1980's. The 1950's were characterized by the social democratic party forming a majority government, i.e., a strong government combined with a majority of socialist votes in the parliament. On the other hand, the typical political picture of the 1980's was a bourgeois coalition government and socialist minority. Consequently, there are two opposing political effects at work. A weaker government has contributed to higher spending levels, while the declining share of socialists has contributed to lower spending levels. The estimated coefficients can be used to check which effect is the strongest.

Table 8 about here

The calculation of the balance between ideology and strength is shown in Table 8, with separate figures for our three measures of political strength.[10] The three bourgeois governments of the 1980's (named after the prime minister) are compared to Gerhardsen's social democratic government of the early 1950's. Willoch I was a one party minority government formed by the conservative party. In 1983 two minor bourgeois parties joined the government, making Willoch

[10] These calculations are based on the equations reported in column A-C in Table 6.

II a majority coalition.[11] Finally, the Syse government, established after the 1989 election, was a minority government comprising the same three parties as Willoch II, and by all measures the weakest government of the decade. According to Table 6, there are no significant spending differences between the strong social democratic government of the 1950's and the Willoch governments of the early 1980's. The effects of reduced socialist influence and weaker governments seem to level each other out. On the other hand, an extremely weak bourgeois government of the Syse-type leads to significantly higher spending levels compared to a strong social democratic government, i.e. the effect of a weaker government dominates the effect of reduced socialist influence.

Our analysis offers an empirical relationship between political strength and public spending. The result is interpreted in the context of internalization of social costs under vertical fiscal imbalance and common pool financing. We have not tested the internalization story against alternative theories of political decision making. An alternative interpretation of the conflict between universalistic overspending and social efficiency is to look at a bargaining situation where a compromise is reached between the district spending pressure and the national political institutions. The compromise is influenced by characteristics of the political structure as above. Von Hagen and Harden (1995) and Borge and Rattsø (1997) apply a model of a bargaining compromise in studies of budget processes and national grants, respectively.

7. CONCLUDING REMARKS

Decentralized government spending has grown rapidly in Norway the last 100 years. As share of GDP, local public spending has increased from 3.2% in 1880 to 18.4% in 1990. The present study investigates this growth process in the context of vertical fiscal imbalance.

The point of departure is a benchmark demand model of public services emphasizing price, income and congestion effects. The demand model is modified to represent the common pool problem resulting from vertical fiscal imbalance. The benefits of decentralized government spending are concentrated to each municipality and county, while the costs are carried by general taxation and to a large extent financed by central government grants. Different from the standard

[11] We refer to the period 1983-1985. After the 1985 election Willoch II became a minority coalition.

universalistic model of the US congress, in parliamentary democracies party fragmentation of the parliament and coalition politics are important for the internalization of costs.

The econometric analysis provides strong support for Wagner's law. The relative size of the local public sector increases as income per capita increases. A unit root in the relative price of local public services points to a Baumol's cost disease. However, the estimated price-elasticity is close to -1, implying that the Baumol effect cannot explain the relative growth of the local public sector.

Party fragmentation of parliament is measured by a Herfindahl index, and has a significant impact on internalization of costs and decentralized spending growth. Two other indicators of political strength, capturing type and duration of government, are shown to have similar effect. Internalization of costs seems to be a serious challenge to the national political system under vertical fiscal imbalance. The asymmetry between decentralized spending and centralized financing contributes to public sector growth. In addition to political strength, political ideology of the majority in parliament influences the size of government spending. A socialist majority drives up the spending level. Since strength has been associated with socialist majority because of fragmentation on the non-socialist side, voters have faced a tradeoff between ideology and strength. Interestingly, our estimates indicate that the weakest non-socialist governments have contributed to higher decentralized spending than the strongest socialist government.

The results of the analysis are consistent with the studies of the US congress showing that majority rule leadership and strong presidents matter for public spending [Inman (1988), Inman and Fitts (1990)]. Party fragmentation introduces an additional aspect of the political system of importance for fiscal policy. Party fragmentation in a multi-party system is related to divided government in the US. Our results also conforms to the understanding that divided government has less fiscal discipline than single-party states [Alt and Lowry 1994, Poterba (1994)]. This type of broad generalizations are of interest for the discussion of reforms of political systems in many countries.

APPENDIX

The following variables are used in the empirical analysis:

G - municipal and county spending per capita, includes both consumption and investment expenditures. Interest payments, down payments on loans and firms owned by municipalities or counties are excluded. Deflated by the national account's price index for local public spending

C - the ratio between the price index for local public spending and the GDP price index

Y - gross domestic product per capita measured in real terms

M - the population size

Π - the inflation rate (measured by the consumer price index)

CA - the current account surplus as share of GDP

YO - the share of population below age 14

EL - the share of population above age 67

SOC - the share of socialist representatives in the parliament

HERF - a Herfindahl index for the party fragmentation of the parliament

GOV - index for government strength

DUR - the duration of the government, number of months

Six major sources are used in constructing the data. These are NOS: National Accounts, NOS: Historical Statistics, NOS: Public Sector Finances, NOS: Population and Housing Census, NOS: Statistical yearbook and SES: Trends in Norwegian Economy 1865-1960, all from the Central Bureau of Statistics. The data on the consumer price index before 1900 is taken from Hodne et al. (1993).

Table A1 about here

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TABLE 1 THE GROWTH OF THE LOCAL PUBLIC SECTOR 1880-1990

	Local public spending as share of GDP (%)	Real per capita spending growth (%)	Real per capita GDP growth (%)	Relative price
1880's	3.3	1.6	1.0	100.0
1890's	3.9	4.0	1.1	101.0
1900's	4.6	1.4	1.2	102.4
1910's	4.9	6.2	2.1	97.6
1920's	7.9	3.2	2.6	105.7
1930's	8.6	3.6	2.7	107.7
1940's[1)]	8.9	9.0	6.2	103.4
1950's	10.5	4.8[2)]	2.7	103.1
1960's	12.0	5.0	3.8	120.5
1970's	15.6	5.0	3.9	136.1
1980's	17.0	3.2	2.2	132.4

[1)] Comprises only the years after WWII
[2)] The year 1959 is excluded

TABLE 2 POLITICAL INDICATORS 1880-1990

	HERF	*GOV*	*DUR*	*SOC*	*YO*	*EL*
1880's	0.58[1]	4.0[2]	60[2]	0.0	35.0	7.0
1890's	0.43	2.9	35	0.0	35.6	7.7
1900's	0.44	3.0	40	4.4	35.2	7.7
1910's	0.36	3.7	51	18.0	33.7	7.7
1920's	0.23	1.5	23	27.5	31.0	7.9
1930's	0.28	2.0	44	41.8	25.6	8.4
1940's[3]	0.31	4.0	238	58.0	23.1	9.4
1950's	0.35	4.0	238	54.5	25.5	10.1
1960's	0.31	2.8	167	49.5	25.0	11.9
1970's	0.29	2.0	69	49.9	23.7	13.6
1980's	0.32	2.2	46	47.7	20.3	15.6

[1] The years 1880 and 1881 are excluded
[2] The years 1880-1883 are excluded
[3] Comprises only the years after WWII

TABLE 3 CORRELATION MATRIX FOR THE INDICATORS OF POLITICAL STRENGTH

	HERF	*GOV*	*DUR*
HERF	1.000		
GOV	0.569	1.000	
DUR	0.008	0.457	1.000

TABLE 4 AUGMENTED DICKEY-FULLER TESTS ON KEY VARIABLES

	g	c	y	Δg	Δc	Δy
J	6	2	0	5	1	5
DF	-0.40	-0.15	1.24	-5.31***	-9.07***	-2.95**

Notes: * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level

TABLE 5 SELECTED ESTIMATION RESULTS

Equation A (OLS):

$$\Delta g = \text{const.} - \underset{(0.037)}{0.213^{***}}\,[g(-2) + \underset{(0.475)}{1.150}\,c(-2)^{**} - \underset{(0.116)}{1.419^{***}}\,y(-2) - \underset{(0.265)}{0.747^{***}}\,SOC(-2)]$$

$$- \underset{(0.076)}{0.461^{***}}\,\Delta\Pi - \underset{(0.065)}{0.210^{***}}\,HERF(-2)$$

Stab. test WW2: F(7,83)=1.44 Stab. test 1959: F(6,84)=0.98

$R^2_{adj} = 0.480$ LM(1) = 1.26 LM(2) = 3.20^{*} LM(3) = 3.08^{*} LM(4)=0.13

Equation B (IV):

$$\Delta g = \text{const.} - \underset{(0.053)}{0.189^{***}}\,[g(-2) + \underset{(0.598)}{1.284}\,c(-2)^{**} - \underset{(0.133)}{1.411^{***}}\,y(-2) - \underset{(0.313)}{0.792^{**}}\,SOC(-2)]$$

$$- \underset{(0.077)}{0.464^{***}}\,\Delta\Pi - \underset{(0.071)}{0.190^{***}}\,HERF(-2)$$

$R^2_{adj} = 0.479$

Notes: standard errors in parentheses; * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level; LM(*j*) is a Lagranges-multiplier test for autocorrelation of *j*-th degree which is distributed χ^2 with 1 d.f.; the sample period is 1884-1939 and 1948-1990 for equation A, and 1884-1939 and 1950-1990 for equation B

TABLE 6 SELECTED ESTIMATION RESULTS USING DIFFERENT MEASURES OF POLITICAL STRENGTH

	A	B	C	D
SOC(-2)	0.159***	0.213***	0.313***	0.236***
	(0.060)	(0.064)	(0.068)	(0.078)
HERF(-2)	-0.210***			-0.122
	(0.065)			(0.086)
GOV1(-2)		0.057***		0.022
		(0.020)		(0.024)
GOV2(-2)		0.033**		0.011
		(0.014)		(0.016)
GOV3(-2)		0.031**		0.006
		(0.014)		(0.018)
dur(-2)			-0.024***	-0.012
			(0.007)	(0.009)
R^2_{adj}	0.480	0.487	0.505	0.508

Notes: OLS estimates with standard errors in parentheses, only the political variables are reported; * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level; the sample period is 1884-1939 and 1948-1990 (A) and 1886-1939 and 1948-1990 (B, C and D)

TABLE 7 ESTIMATING THE DEGREE OF INTERNALIZATION (θ)

	θ_0	θ_1	θ_{MIN}	θ_{MEAN}	θ_{MAX}
HERF	0.454	-6.553*	0.69	0.85	0.97
	(0.641)	(3.678)			
DUR	0.385	-0.101**	0.53	0.94	1.00
	(1.035)	(0.050)			

Notes: nonlinear least square estimates with standard errors in parentheses; * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level; the sample period is 1884-1939 and 1948-1990 (*HERF*) and 1886-1939 and 1948-1990 (*DUR*)

TABLE 8 THE PREDICTED LONG RUN SPENDING DIFFERENCE (%) BETWEEN THE SOCIALDEMOCRATIC GOVERNMENT OF THE EARLY 1950'S AND BOURGEOIS GOVERNMENTS OF THE 1980'S

	HERF	*GOV*	*DUR*
Willoch I (1981-83)	-2.7	3.0	12.2
Willoch II (1983-85)	-2.7	2.0	7.6
Syse (1989-90)	7.5	19.0**	25.0**

Notes: * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level

TABLE A1 ESTIMATION RESULTS, THE GENERAL MODEL

Δg = const. $- 0.309^{***}\ \Delta g(-1) - 0.459^{***}\ g(-2)$
(0.111) (0.097)

$- 0.148\ c + 0.339\ c(-1) - 0.237\ c(-2)$
(0.201) (0.237) (0.192)

$-0.393^{*}\ y - 0.012\ y(-1) + 0.565^{**}\ y(-2)$
(0.232) (0.261) (0.240)

$+ 0.658\ m + 2.20\ m(-1) - 1.56\ m(-2)$
(5.21) (9.46) (4.87)

$-0.385^{***}\ \Pi + 0.204\ \Pi(-1) + 0.154\ \Pi(-2)$
(0.122) (0.133) (0.125)

$- 0.109\ CA + 0.010\ CA(-1) - 0.109\ CA(-2)$
(0.190) (0.207) (0.206)

$- 3.66\ YO + 0.31\ YO(-1) + 1.90\ YO(-2)$
(11.48) (22.47) (11.41)

$+ 36.60\ EL - 19.58\ EL(-1) - 14.51\ EL(-2)$
(22.52) (38.72) (22.38)

$- 0.111\ SOC + 0.150\ SOC(-1) - 0.081\ SOC(-2)$
(0.212) (0.229) (0.204)

$- 0.017\ HERF + 0.108\ HERF(-1) - 0.156\ HERF(-2)$
(0.128) (0.157) (0.131)

$R^2_{adj} = 0.479$ LM(1) = 0.63 LM(2) = 1.80 LM(3) = 1.90 LM(4)=0.39

Notes: standard errors in parentheses; * denotes significance at the 10% level, **at the 5% level and *** at the 1% level; LM(*j*) is a Lagranges-multiplier test for autocorrelation of *j*-th degree which is distributed χ^2 with 1 d.f.; the sample period is 1884-1939 and 1949-1990