

Essays on Redistribution and
Local Public Expenditures

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Abstract

This thesis consists of a summary and four papers. The first two papers are theoretical contributions within the area of optimal taxation and public expenditures under asymmetric information between the government and the private sector, and the last two are empirical contributions to the literature on local public expenditures.

Paper [I] concerns the optimal use of publicly provided private goods in an economy with equilibrium unemployment. The paper points out that imperfect competition in the labor market gives rise to additional policy incentives associated with the self-selection constraint, which motivates adjustments in the public provision of private goods. It also addresses employment related motives behind publicly provided private goods.

Paper [II] addresses optimal income and commodity taxation in a dynamic economy, where used durable goods are subject to second-hand trade. In our framework, the government is unable to directly control second-hand transactions via commodity taxation. We show how the appearance of a second-hand market affects the use of commodity taxation on the new durable goods as well as the use of income taxation.

Paper [III] relates the existence and size of the flypaper effect to observable municipal characteristics. The analysis is based on a political economy model, which implies that the effect of a change in the tax base on the majority voter's tax share will be crucial for finding a flypaper effect. The empirical part is based on Swedish data on municipal expenditures and revenues for the period 1996-2004. The results show that the size of the flypaper effect varies among municipalities depending on the relative composition of grant and tax base.

In Paper [IV], the composition of municipal expenditures in Sweden is analyzed by estimating a demand system for local public services, in which tax revenue collection is treated as endogenous. The estimation is based on the QAIDS specification and uses panel data for the period 1998-2005 and for six local public services. The results show that the point estimates of the income elasticities are positive (with one exception), whereas the point estimates of the own-price elasticities are negative and less than one.

Key Words: optimal taxation, unemployment, durable goods, flypaper effects, intergovernmental relations, demand system, local government spending

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I arrived at the Department of Economics filled with expectations. The staff's polite reception disappeared before long and was replaced by confusion around my assignment. I had been encouraged to study for a PhD, but my specific research task was lacking. Since then, the situation around my thesis has been characterized by vagueness and numerous assumptions. Clarifying my assignment felt nearly impossible; in fact, it was comparable to entering a far-away castle. I remember there being two assistants that were designated to elucidate the confusion regarding my undertaking, assistants that were always assigned to me during my stay at the Department. After a while it was decided that I should disrupt my writings and, instead, focus on a temporary job at the institution of higher education. This meant that I practically had to stay all night at campus. Later on the administration dispatched me to America in order to return to my learning and, one again, to clarify the confusion regarding my thesis. My obligation has slowly but surely become clearer; the fog has lifted around the fortress. The assistants have recently come with unconfirmed reports indicating that I may be close to the end of my work. According to this rumour, higher authorities within the administration are expected to prepare some kind of announcement. To my understanding, a grading committee is supposed to be near a decision on the subject of my educational rank. I look forward to verifying this information and I entertain a strong confidence that the castle soon will be taken.

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Umeå, February, 2008

Mikael Witterblad

This thesis consists of a summary and the following four papers:

- [I] Aronsson, T., Markström, M. and Sjögren, T. (2005) Public Provision of Private Goods and Equilibrium Unemployment. *FinanzArchiv* 61(3), 353-367. (Reprinted with kind permission of Mohr Siebeck)
- [II] Aronsson, T., Sjögren, T. and Witterblad, M. (2008) Optimal Taxation and Asymmetric Information in an Economy with Second-Hand Trade. Mimeo.
- [III] Witterblad, M. (2007) Income Heterogeneity and the Flypaper Effect. *Umeå Economic Studies* 718.
- [IV] Witterblad, M. (2008) The Demand for Local Public Services in Sweden. *Umeå Economic Studies* 730.

1 Introduction

This thesis consists of four papers. Papers [I] and [II] are theoretical contributions within the area of optimal taxation and public expenditures under asymmetric information between the government and the private sector. Paper [I] concerns the optimal use of publicly provided private goods in an economy with equilibrium unemployment, whereas Paper [II] analyzes optimal income and commodity taxation in a dynamic economy where used durable goods are subject to second-hand trade. Paper [III] and [IV] are empirical contributions to the literature on local public expenditures. Paper [III] relates the existence and size of the flypaper effect to observable municipal characteristics, whereas Paper [IV] analyzes the composition of local public services using Swedish municipality data.

This introductory chapter is organized as follows. Section 2 presents an overview of relevant earlier literature for the first part of the thesis and summarizes Papers [I] and [II]. Section 3 is concerned with the background to the second part of the thesis and summarizes Papers [III] and [IV].

2 Optimal Nonlinear Taxation and Provision of Public Services

There is a large literature dealing with the optimal use of nonlinear income taxation and supplemental commodity taxation.¹ The underlying decision-problem is that of redistribution under asymmetric information: the government is unable to observe individual ability (in which case it is also unable to implement the first best resource allocation via ability-type specific lump-sum taxes).

To exemplify the policy incentives underlying the use of income taxation, consider the two-type optimal income tax model developed by Stern (1982) and Stiglitz (1982), where a distinction is made between a low-ability type and a high-ability type, which differ in productivity (measured in terms of the gross wage rate). Furthermore, assume that the government wants to redistribute from the high-ability type to the low-ability type. In this case, the government

¹Seminal contributions to the literature on optimal nonlinear taxation and redistribution have been made by Mirrlees (1971, 1976), Atkinson and Stiglitz (1976) and Atkinson (1977), Stern (1982), Stiglitz (1982) and Edwards et al. (1994).

must not redistribute in such a way that the high-ability type would like to pretend to be a low-ability type, i.e. become a mimicker, in order to gain from the redistribution. The self-selection constraint serves to prevent mimicking: the self-selection constraint that may bind in this specific example means that the high-ability type must (weakly) prefer the allocation intended for him/her over the allocation intended for the low-ability type. As a consequence, the government may use the tax system to make mimicking less attractive which, in turn, creates further room for redistribution. One way to relax the self-selection constraint is by imposing a marginal labor income tax on the low-ability type (the agent that might be mimicked in our example). By relaxing the self-selection constraint, the government may transfer more resources from the high-ability to the low-ability type without creating strong enough incentives for the high-ability type to become a mimicker.

For reasons similar to those described above, other tax instruments might be useful as a supplement to the labor income tax. If the high-ability type is the potential mimicker, differentiated commodity taxation may contribute to make mimicking less attractive by encouraging the consumption of goods that are substitutable for leisure and discouraging the consumption of goods that are complementary with leisure (Edwards et al., 1994). The intuition is that the mimicker consumes more leisure than the low-ability type (as the mimicker is more productive than the low-ability type and needs to supply fewer hours of work than the low-ability type to reach the income-consumption point intended for the low-ability type). Brett (1997) studies redistribution under asymmetric information in an intertemporal setting. He argues that the use of a non-zero marginal capital income tax on the low-ability type (who also is the mimicked agent in this framework) may contribute to relax the self-selection constraint, since the marginal rate of substitution between current and future consumption may differ between the low-ability type and the mimicker. This is discussed in more detail below.

Another possible mechanism for relaxing the self-selection constraint goes via the wage distribution. This mechanism requires, of course, that the gross wage rates are endogenous. A higher gross wage rate for the low-ability type, relative to the gross wage rate for the high-ability type, makes mimicking less attractive if the high-ability type is the mimicker. Naito (1999) shows, in the context of a static model, that the use of differentiated commodity taxation

is also motivated if it contributes to relax the self-selection constraint via the wage distribution. Pirttilä and Tuomala (2001) argue that the use of marginal capital income taxes may also be justified for a similar reason. This is further discussed below.

2.1 Labor Market Distortions

Earlier studies on optimal nonlinear taxation often assume a competitive labor market. Allowing for imperfect competition in the labor markets will, in general, imply that the equilibrium is characterized by unemployment. Considering that many industrialized countries have experienced high unemployment rates for a long time, it is clearly relevant to consider imperfectly competitive labor markets in the context of optimal taxation and provision of public services. Note also that reducing unemployment is, by itself, a way of accomplishing redistribution.

Marceau and Boadway (1994) analyze minimum wages and unemployment insurance as additional policy instruments in an optimal tax and expenditure problem under asymmetric information. They conclude that a higher minimum wage may be welfare improving, if the higher expected utility for the low-ability type makes up for the tighter self-selection constraint (the high-ability type is assumed to act as mimicker). Another situation with imperfect competition in the labor market arises when trade-unions have an influence on the wage formation.² Aronsson and Sjögren (2003) assume that the hourly gross wage rates are decided upon by monopoly unions and analyze optimal taxation and provision of public goods in a mixed tax problem with two ability-types.³ They show that union wage formation implies that a broader set of variables affects the distribution of gross wage rates than under competitive labor markets, and that the appearance of equilibrium unemployment provides an incentive for the government to use the policy instruments in order to increase the number of employed persons. This will modify the policy rules for the marginal income tax rates, the commodity taxes and the public good.⁴

²An overview of theories of wage formation in unionized labor markets is given by Oswald (1985).

³There is also a literature dealing with optimal tax progression under imperfect competition in the labor market (Fuest and Huber, 1997; Aronsson and Sjögren, 2004a,b).

⁴There is a related literature dealing with different aspects of union wage setting and optimal linear income taxation in an open economy (see Boeters and Schneider, 1999; Koskela and Schöb, 2000).

Engström (2002) models optimal redistribution policy and unemployment by using a search unemployment model, where unemployed workers derive disutility from search (the model is further discussed in Pissarides, 2000).⁵ He finds that the policy maker may improve the welfare by reducing the risk of unemployment for the low-ability type.

2.2 Public Provision of Private Goods

Publicly provided private goods constitute another type of instrument that may be used for redistribution purposes. Public provision of private goods is typically analyzed as a supplement to nonlinear income taxation in the context of redistribution under asymmetric information.⁶ The early literature on public provision of private goods under asymmetric information assumes that the hourly gross wage rates are fixed (see e.g. Blomquist and Christiansen, 1995, 1998a,b; Boadway and Marchand, 1995; Boadway et al., 1998). Blomquist and Christiansen (1995) argue that the private goods suitable for public provision are those that cannot be supplemented by the private agents or resold and lack a close market substitute (such as education, health care and care for the elderly), i.e. the provision should not be equivalent to a transfers in cash. They examine situations where the low-ability type accepts the public provision scheme, whereas the high-ability type only accepts the public provision scheme under certain conditions. In order to discourage mimicking, an optimal level of public provision may imply that the low-ability type either overconsumes or underconsumes the publicly provided private good relative to the first-best rule.

Boadway and Marchand (1995) provide a rationale for public provision of private goods when individuals are allowed to supplement (top up) the publicly provided quantity by private consumption. They show that public provision of private goods may relax the self-selection constraint if the mimicker's private purchase of the publicly provided good becomes crowded out (i.e. falls to zero), while the true ability-type's private purchases are not. The intuition is that further increases in the public provision of the private good will restrict the

⁵Engström (2003) introduces unemployment benefits in this analysis, whereas Engström (2007) deals with the importance of tax progression for the bargained wage.

⁶There is also a literature which assumes other tax instruments when studying public provision of private goods. Munro (1991, 1992) analyzes public provision of private goods supplemented by linear taxes, whereas Balestrino (2000) studies public provision of private goods in combination with mixed taxation.

mimicker, which makes the mimicker worse off. Boadway and Marchand also find that if leisure is weakly separable from the other goods in the utility function, it is not possible to increase welfare via public provision of private goods. In this case, the mimicker and low-ability type become crowded out at the same point.⁷

Pirttilä and Tuomala (2002) extend the analysis by allowing the wage rates to be endogenous, and also by assuming that the publicly provided private good gives rise to an external effect in the production. In their model, the wage rate becomes a function of the publicly provided private good. This means that the publicly provided private good affects the self-selection constraint also via the wage distribution. Pirttilä and Tuomala show that if the wage rates depend on the publicly provided quantity of a private good, there will be a role for such public provision even if leisure is weakly separable from the other goods in terms of the utility function. The explanation is, as mentioned above, that a higher relative wage rate for the low-ability type implies that the mimicker needs to supply more hours of work in order to reach the same income as the low-ability type, which relaxes the self-selection constraint.

Summary of Paper [I] The purpose of this paper is to analyze public provision of a private good under equilibrium unemployment. We assume that the government is unable to observe individual ability. In addition to the publicly provided quantity of the private good, the set of policy instruments contains a nonlinear income tax and unemployment benefits. The paper contributes to the literature in primarily two ways. First, the paper points out that imperfect competition in the labor market gives rise to additional policy incentives associated with the self-selection constraint, which motivates adjustments in the public provision of private goods. Second, the paper also addresses employment motives behind publicly provided private goods.

We apply the self-selection approach developed by Stern (1982) and Stiglitz (1982), which means that the consumers are divided into two types: a low-ability type and a high-ability type. The wage rate of each ability type is determined

⁷Blomquist and Christiansen (1998a) use the same model as Boadway and Marchand when analyzing the conditions under which public provision schemes should allow for topping up. They show that it will be at least weakly preferable to allow for private purchases as a supplement to the public provision, instead of just having public provision, if the publicly provided private good is a substitute for leisure in terms of the utility function.

in a bargain between unions and firms in a right-to-manage framework. Union wage formation distorts wage setting and leads to equilibrium unemployment. The gross wage rate facing each ability-type will be a function of (among other things) the publicly provided quantity of the private good.

Our results imply that public provision of private goods can be used for redistribution purposes by influencing the self-selection constraint and by affecting the number of employed persons. We show that union wage formation implies that a broader set of variables affects the hourly wage rates than under competitive labor markets, which is relevant from the perspective of relaxing the self-selection constraint. In addition, the policy maker may also use the public provision of the private good to increase the number of employed persons. The intuition is that an increase in the number of employed persons leads to higher tax revenues net of transfer payments, which relaxes the financial burden on the public sector.

2.3 A Dynamic Economy

Earlier literature on redistribution under asymmetric information in dynamic economies has mainly focused on whether capital income taxation ought to be used as a supplement to the labor income tax. In a pioneering study, Ordober and Phelps (1979) model a continuum of ability-types and find that if leisure is separable from the other goods in the utility function, then the marginal capital income tax rate should be zero for each ability-type.

More recent studies use two-type models (in an OLG context) when analyzing optimal redistribution under asymmetric information in dynamic economies. Brett (1997) shows, by relaxing the separability assumption made by Ordober and Phelps (1979), that the marginal capital income tax rate of the low-ability type (who is assumed to be the mimicked type) may be either positive or negative, depending on whether the marginal rate of substitution between current and future consumption for the low-ability type exceeds, or falls short of, the corresponding marginal rate of substitution for the mimicker. For instance, if the low-ability type attaches a higher relative value to current consumption than the mimicker (i.e. a higher marginal rate of substitution between the current and future consumption), the government may discourage mimicking by choosing a higher marginal income tax on capital for the low-ability type than it would otherwise have done. Boadway et al. (2000) analyze nonlinear labor in-

come taxation and proportional capital income taxation in a dynamic economy with two-ability types, where the government neither can observe ability nor inherited wealth. In their framework, the capital income tax is interpretable as an indirect instrument to tax wealth. They find that unobservable inheritance makes it desirable to supplement labor income taxes by a proportional capital income tax in order to collect revenue in a more efficient way.⁸

Pirttilä and Tuomala (2001) extend the previous literature by analyzing marginal capital income taxation in an economy with endogenous gross wage rates. The endogenous gross wage rates result in additional mechanisms for relaxing the self-selection constraint. In addition to the motive for capital income taxation discussed by Brett (1997), they find that production inefficiency at the second best optimum (due to that the capital stock influences the wage distribution) justifies capital income taxation. Aronsson et al. (in press) study the case with trade-union wage formation and the appearance of equilibrium unemployment in the second best optimum. In their model, the marginal capital income taxation also affects the employment. They show that there is an employment-motive behind the use of labor income and capital income taxation. Part of the employment-motive for using capital income taxation is related to intertemporal production inefficiency at the second best optimum, as a change in the capital stock affects the number of employed persons.

2.3.1 Durable Goods and Second-hand Trade

The second paper in this thesis is the first study that incorporates a second-hand market into the framework for studying redistribution under asymmetric information. Much of the earlier research dealing with optimal taxation and durable goods is found in the area of environmental economics,⁹ whereas the literature concerning second-hand markets for durable goods has focused on the second-hand trade with cars. The latter is often based on the adverse selection approach developed by Akerlof (1970). Akerlof showed that if the

⁸Tenhunen and Tuomala (2007) argue that if some individuals discount future utility in a way different than the social planner or behave myopic, there will also be a paternalistic motive for using capital income taxation when redistributing between generations.

⁹Runkel (2004) analyzes taxation of a pollution-generating durable good in an economy where the producers operate under imperfect competition. There is also a large literature on environmental policy in intertemporal models, in which the environmental quality has durable good properties.

owners of used cars know more about the quality of the car than a buyer, this will be an important source of inefficiency in the second-hand trade. Hendel and Lizzeri (1999) analyze a dynamic model and allow for interactions between the second-hand market for used cars and the market for new cars.¹⁰ They show that the interaction between the markets may lead to a higher price of new cars if there is adverse selection in the second-hand market. In contrast to Akerlof, they find that the second-hand market never shuts down (due to adverse selection) and that the distortions are lower than previously thought. Hendel and Lizzeri (2002) find that leasing contracts serve to ease the consequences of adverse selection by increasing the average quality of used durables good traded in second-hand markets.¹¹ Gilligan (2004) finds empirical evidence for the predictions made by Hendel and Lizzeri (1999, 2002) when using data for used aircrafts in North America.

Summary of Paper [II] The purpose of this paper is to study optimal income and commodity taxation in a two-type OLG model, where used durable goods are traded in a second-hand market. Our paper is the first study that analyzes second-hand trade of used durable goods in the context of redistribution under asymmetric information.

In our model, each consumer generation lives for two periods. The consumer derives utility from the consumption of a nondurable good and a durable good as well as from leisure. New and used durable goods are assumed to be imperfect substitutes in consumption. Furthermore, the production structure is such that the gross wage rates are endogenous. The supply of the used durable good is constrained by the amount bought of the new durable good in the previous period. The set of policy instruments consists of nonlinear taxes on labor and capital income as well as a linear commodity tax on the new durable good. However, the government is unable to directly control second-hand transactions via commodity taxation. Instead, the government needs to rely on the other tax instruments in order to indirectly affect the price of the used durable good.

Our model shows that the marginal value that the government attaches to the used durable good depends on whether leisure is a complement or a substitute to the used durable good. It also depends on how a change in the

¹⁰See also related studies, e.g. Anderson and Ginsburgh (1994), Sattler (1996), Sandfort (1997) and Porter and Sattler (1999).

¹¹See also Guha and Waldman (1996).

price of the used durable good influences the wage distribution. The results imply that if the government attaches a positive marginal value to the used durable good (i.e. the government finds it desirable to make the used durable good less scarce), it follows that the appearance of a second-hand market for the used durable good provides an incentive for the government to choose a lower commodity tax on the new durable good than it would otherwise have done. The intuition is that a lower commodity tax on the new durable good leads to a lower price of the used durable good in the present period and increases the supply of the used durable in the next period. Our results also show how the appearance of a second-hand market modifies the use of income taxation. The marginal labor income tax rates affect the labor supply and, therefore, indirectly also the price of the used durable good. To be more specific, the modification of the marginal labor income tax structure caused by the second-hand market depends on whether leisure is a complement or a substitute to the new and used durable good. The modification of the marginal capital income tax rates are ambiguous because a change in the capital income tax affects the current and future price of the used durable good in opposite directions.

3 Local Public Expenditures

The most frequently used model when analyzing local public expenditures is the "median voter" model. According to this model, the size of the public spending is decided upon using a majority rule in the locality. The result, originally derived by Bowen (1943) and explained in greater detail by Black (1958), implies that the voter who has the median preferred outcome will be the decisive. This result requires that the preferences of the voters are single peaked, that there is no strategic voting and that the choices are one dimensional.

A key problem in empirical studies has been the identification of the median voter.¹² The most common approach is to identify the median voter as the voter with the median income (see e.g. Bradford and Oates 1971a,b; Borcharding and Deacon, 1972; Bergstrom and Goodman, 1973). Such an interpretation requires several assumptions, see e.g. Bergstrom and Goodman (1973). Wildasin (1986) points out that the person with the median income is not, in general, the median

¹²In a pioneering study, Barr and Davis (1966) assume that the individuals differ in their ownership of property. As a result the individual with the median property value share becomes decisive.

voter.¹³

Another problem with the median voter model is how to treat multidimensional issues. Applying the model to a system of public sector demand equations implies that the median voter generally will differ for different services. Extensions of the traditional median voter model (based on deterministic voting) to the multidimensional case gives a probabilistic voting model (see Enelow and Hinich, 1984). Probabilistic voter models consider elections in which candidates are unsure as to whether voters' preferences will be on all or most issues. A fundamental question concerns the optimal strategy for the candidates given uncertainty about voter preferences. Craig and Inman (1986) propose a voter group decision model to solve the multidimensionality problem, where the allocation is a political compromise among voter groups. In this model, the political influence is either defined in terms of the age composition (Craig and Inman, 1986; Borge and Rattsø, 1995) or by using the party composition in the local council (Renaud and Winden, 1991).

3.1 The Aggregate Local Public Expenditure

There is a large literature dealing with the aggregate local public expenditure. Since the beginning of the 1970s, it has been common to use median voter models (see e.g. Borcharding and Deacon, 1972; Bergstrom and Goodman, 1973). In these empirical studies, the median voter is defined as the voter with median income. Much of the attention focuses on how variables characterizing the median voter's budget constraint, such as the median voter's tax price and the median income, affect the demand for local public services. Borcharding and Deacon (1972) assume that the tax price is constant and find that the point estimate of the income elasticity is positive; between zero and one. Bergstrom and Goodman (1973) derive more rigorous demand equations for municipal public services, where the demand for local public spending also depends on the tax price (tax share).¹⁴ The main results from their study are that local public expenditures, in general, depend negatively on the tax price and positively on the median voter's income. Bergstrom and Goodman also find that size of

¹³For a test of the median voter model on Swedish data, see Aronsson and Wikström (1996).

¹⁴Using the median voter approach when analyzing the determinants of the local public expenditures in Sweden, Aronsson and Wikström (1996) estimated the income elasticity to be 0.82 and the price elasticity to be 0.53 in absolute value.

the jurisdiction may be important for the demand of local public expenditures, i.e. larger municipalities do not appear to benefit from economies of scale in the provision of public services. Other studies have extended the study of local public expenditure determination by including socio-economic indicators to account for the effects of social needs and political considerations (see Dunne and Smith, 1983; Dunne et al., 1984; etc).

3.1.1 The Flypaper Effect

According to the 'basic' median voter model, where the tax price is treated as fixed by the median voter, the source of public revenues should not matter for the local public expenditure decision.¹⁵ This is so because a transfer payment from the central to the local government is effectively equivalent to a transfer payment to the decisive voter. This result is questioned by an extensive empirical literature that finds that local public spending responds more to increased transfers from the central government than to a corresponding increase in the tax base, an empirical finding that is labelled the "flypaper effect".¹⁶

Several competing hypotheses aim to explain the flypaper effect.¹⁷ Niskanen (1968) and Romer and Rosenthal (1980) argue that disharmony of interest between voters and bureaucrats/politicians is the main reason for the flypaper effect. Similar for Niskanen's model of bureaucratic behaviour and Romer and Rosenthal's agenda setter model is the assumption that the official authority (represented by the bureaucrats in the former case and an agenda setting agent in the latter case) acts in its own interest and tries to maximize the local public budget. In contrast to the voters, the bureaucrats/agenda setters are assumed to have information on tax and other revenues as well as the cost of production. The control over the budget in combination with the behaviour of the bureaucrats/agenda setters increase the marginal propensity to spend out of lump-sum grants. Another often cited explanation for the flypaper effect is the "fiscal illusion" hypothesis (see Courant et al., 1979; Oates, 1979). Fiscal illusion means, in the context of the flypaper effect, that the voters' perceived effect of the local public budget is what really matters: a flypaper effect exists because the local officials are assumed to use lump-sum grants to deceive local voters into

¹⁵See Bradford and Oates (1971a,b).

¹⁶The result was labelled the "flypaper effect" by Courant et al. (1979).

¹⁷A good survey is given by Bailey and Connolly (1998).

thinking that the cost of publicly provided services is less than it actually is.¹⁸ Fossett (1990) and Turnbull (1992) address the importance of including uncertainty and instability of grant revenue in the analysis. According to Fossett, it is not in the interest of local officials that the local tax rate fluctuates too much over time. The flypaper effect is, thereby, a result of risk aversion and caution by the local officials. A more recent explanation for the flypaper effect is presented by Hines and Thaler (1995). They argue that the flypaper effect is a result of resource fungibility, i.e. that different types of revenues are allocated into different "mental accounts."

The evidence for the existence of a flypaper effect is mixed. The early empirical literature dealing with the flypaper effect can be criticized for not separating lump-sum grants from matching grants (see King, 1984). Moffitt (1984) emphasizes the problem of ignoring the simultaneous determination of matching grants and public expenditures. He estimates the effect of piecewise-linear budget constraints created by grant formulas, where the subsidy rate is not constant over expenditures, and finds that the flypaper effect disappears. Recent studies addressing these problems are criticized for using an inappropriate functional form, e.g., studies that use a linear-in-variables functional form often find support for a flypaper effect, while studies based on logarithms of all variables do not (Becker, 1996; Worthington and Dollery, 1999). Hamilton (1983) contends that empirical support for the flypaper effect is affected by the omitted variable biases. Subsequent efforts to correct for omitted variables that may correlate with intergovernmental transfers come to different conclusions regarding the flypaper effect (Wyckoff, 1991; Knight, 2002; Gordon, 2004; Dahlberg et al., 2007). Empirical support for a flypaper effect is generally demonstrated for certain situations, rather than across the board. Moision (2002) finds that the flypaper effect varies for different categories of expenditures; it is larger for 'education and culture' and 'comprehensive schools' compared to other local public services. Other studies find that the response in local public expenditures to a change in the lump-sum transfers from the central government is asymmetric, depending on whether the transfer increases or decreases (Gramlich, 1987; Gamkhar and Oates, 1996; Karlsson, 2006).

¹⁸The empirical results for the fiscal illusion explanation are mixed. Dollery and Worthington (1995) and Borge (1995) find empirical support for the explanation, whereas Wyckoff (1991) rejects the hypothesis.

Summary of Paper [III] The purpose of this paper is to analyze the determinants of the local public expenditures and, in particular, test for a flypaper effect. The paper focuses on an aspect of income heterogeneity, which is not previously discussed in the literature dealing with the flypaper effect. A political economy model is presented, where the voters are divided into low-income and high-income earners. This means that a change in the tax base, in addition to its effect on the local public budget, changes the income distribution: an effect which does not appear when transfer payment from the central government changes. The model implies that the effect on the majority voter's tax share, caused by a change in the tax base, will be crucial for finding a flypaper effect. The intuition is that a change in the private income for any of the two voter groups affects the relative financial burden (tax share) of the majority voter group and, therefore, its willingness to use taxation as a marginal source of funds for public expenditures. Another implication of the model is that the spread of private income will be important for the local public expenditures. In the special case with a single ability-type in the local economy, there is no flypaper effect (i.e. if the two voter groups were identical).

The empirical part of the paper estimates a model of local public expenditures, which is related to the theoretical discussion, and tests for a flypaper effect. The regressions are based on panel data containing between 282 and 287 Swedish municipalities and nine years, 1996-2004. The data is particularly suited for studying the flypaper effect because transfers from the central to the local government in Sweden are, to a large extent, general grants during the study period. The empirical analysis finds evidence of flypaper effects. The benchmark specification, which corresponds to previous empirical literature, results in a point estimate of the flypaper effect of about three. This specification is rejected when it is tested against more general specifications where different aspects of income heterogeneity are considered. The results of the extended models imply that the size of the flypaper effect is larger in municipalities where a relatively high share of the residents are low-income earners and that the flypaper effect becomes larger as the proportion of grants in relation to the sum of grant and tax base increases.

3.2 The Composition of Local Public Expenditures

Previous studies dealing with the expenditure composition in the local public sector often assume that the municipality acts as if the policies are decided upon by a representative individual. Solving such a decision problem for the local government yields a system of estimable demand equations. Expenditure composition problems in the public sector are thereby treated in a way similar to consumer choices in the private sector. This approach was first applied by Deacon (1978). He estimates a demand system for local public services in which a given local public budget is allocated between the service sectors.¹⁹ The results indicate that the point estimates of the compensated own-price elasticities are all negative, and that the demand for local public services is homogenous of degree zero in local public income and all prices.

The model used by Deacon is consistent with the idea of two stages budgeting, where the local public revenues are collected in a first stage and allocated between the service sectors in a second stage. Borge and Rattsø (1995) also estimate a demand system for local public services in which the local public revenues are predetermined (by the central government). They use a voter group decision model where different age groups compete for local public services, and allow for inertia in the adjustment process. They find that there is a systematic difference between the short- and long-run budget elasticities, and that the point estimates of the budget elasticities are all close to unity in the short run. The point estimates of the compensated own-price elasticities are all negative and, in general, less than one in absolute value. Their result also suggests that the age composition is important for the allocation of local public services: due to mean reversion, age groups which are declining in relative size are able to resist reallocations and gain in terms of local public per-capita expenditures. In a related study, Aaberge and Langørgen (2003) treat user fees as a local tax instrument (all other sources of revenue²⁰ are treated as exogenous). The estimation results imply that 'social services' is the service sector with the lowest point estimate of the budget elasticity (close to zero), whereas 'infrastructure' is the sector with the highest point estimate of the budget elasticity.

A problem in the analysis of the demand for public services is the lack of

¹⁹Deacon estimates the demand system by using US data. He studies the demand for six local public services in the city of Seattle for the period 1921-1970.

²⁰Intergovernmental grants, local tax rates as well as the local tax base are assumed to be determined by the central government.

appropriate measures of public output. The most common solution is to use expenditure as a proxy for output. The lack of information on service volumes also makes the identification of price effects problematic. A useful approach to get around the problem is to calculate the operating cost per unit of labor corrected for matching grants (see Ehrenberg 1973; Bahl et al. 1980). This "public employment approach" has been applied to Norwegian data by Borge and Rattsø (1995) and Aaberge and Langørgen (2003).

Summary of Paper [IV] The purpose of this paper is to analyze the composition of municipal expenditures in Sweden. This is done by estimating a demand system for local public services, in which tax revenue collection is treated as endogenous. The local public expenditures are analyzed by using a 'community preference' model, where a representative agent allocates her/his resources between the consumption of private goods and public services. The representative agent's demand for each good depends on the total per capita income, prices and municipal characteristics.

In contrast to earlier literature on composition of local public expenditures, this paper does not separate the local public budget process into two steps. Instead, the decision to collect revenue is analyzed simultaneously with the decision to allocate the resources between different local public services. This approach implies that also a composite private good should be included in the system of demand equations. Furthermore, this paper is the first study that analyzes the local public expenditure composition using Swedish data.

The empirical part of the paper uses panel data for the period 1998-2005 and 273 Swedish municipalities. The estimations are based on the QAIDS specification and the analysis presents results from estimating a demand system consisting of a composite private consumption good and six local public services (child care, social services, elderly care, comprehensive education, 'infrastructure and protection' and 'other expenditures'). The results show that the point estimates of all income elasticities except one are positive, and that none of them significantly exceeds one. Comparing the income elasticities between municipalities indicates only small differences. Furthermore, the own-price elasticities are negative and less than one in absolute value for all services. For purposes of comparison with previous studies, a demand system that is conditioned on the resources available to the local public sector is also estimated. The results

from this conditional demand system do not deviate much from related studies.

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