UPPSALA
UNIVERSITET

Uppsala Center for Fiscal Studies
Department of Economics

Working Paper 2013:12

Consumption smoothing in a balanced budget regime

Lovisa Persson

Uppsala Center for Fiscal Studies
Department of Economics
Uppsala University
P.O. Box 513
SE-751 20 Uppsala
Sweden
Fax: +46 18 471 14 78

Working paper 2013:12
October 2013

Consumption smoothing in a balanced budget regime

Lovisa Persson

Consumption smoothing in a balanced budget regime*

Lovisa Persson†

October 1, 2013

Abstract

I investigate consumption smoothing (sensitivity) under a balanced budget rule in Swedish municipalities. In general, I find Swedish municipalities to be highly consumption sensitive during the time period 2001-2011 when the BBR was in place. A one percentage increase in predicted current revenues leads to a 0.74-0.76 percentage increase in current consumption. I use fiscal indicators - the level of own funds and net operating surplus - as proxies for budget balance boundness. Municipalities that perform well in both these fiscal areas are more smoothing than municipalities that do not perform well in either, implying that budget balance plays a role for consumption smoothing behavior. However, consumption sensitivity has decreased in the aggregate since the implementation of the BBR. A possible story is that municipalities were primarily upward sensitive before the BBR, and primarily downward sensitive after the BBR. This explanation also fits the descriptive picture that the aggregate surplus in the sector has turned to positive from negative since the BBR implementation.

Keywords: Local public finance. Balanced budget rules. Consumption smoothing. Fiscal consolidation. Fiscal institutions.

JEL codes: H77, H74, D78, D60

*I am grateful to comments from Per Tovmo, Eva Mörk, Mikael Elinder, Matz Dahlberg, Mikael Lindahl, Rita Ginja, Jonas Kolsrud, Oskar Tysklind, participants at the 2012 ERSA Umeå summer school and UCFS Brown Bag seminar at Uppsala University. I am also grateful for the financial help received from Anna Maria Lundin's scholarship committee.

†Department of Economics at Uppsala University and Uppsala Center for Fiscal Studies. Email: lovisa.persson@nek.uu.se

1 Introduction

A majority of OECD countries have a balanced budget rule (BBR) that applies to local level public finances.[1] It has long been realized that there is a trade-off involved in the implementation of a BBR. On the one hand, a BBR reinforces the dynamic budget constraint and thereby prevents opportunistic policy makers from accumulating high levels of debt. On the other hand, policy makers that adhere to a BBR might be forced to make spending cuts during a temporary recession in order to avoid running a deficit. Since local public sector demand constitute a considerable part of aggregate demand in many countries, local public sector cut-backs might have a destabilizing effect on an already dispirited economy. Beyond the stabilization argument there is also the general idea that policy makers should not adjust policy in response to changes in temporary economic conditions. In the tax- and consumption smoothing literature, a forward-looking social planner incorporates information about future conditions into today's decision making, and thereby leaves policy unaffected by foreseen disturbances. In this perspective, a BBR will have a negative gross effect on welfare if it prevents the use of deficits in order to smooth policies over time.

In this paper I study the role of BBR's in local fiscal decision making, using Swedish municipal data from the time period 1993-2011. The hypothesis is that a BBR will generate myopic policies - in particular referring to the phenomenon of consumption sensitivity - as local public officials can no longer use their discretion to run deficits during a temporary revenue decline. Consumption sensitivity should be contrasted with consumption smoothing, which is the benchmark result of the permanent income hypothesis. Apart from generally analyzing consumption smoothing (sensitivity) under a BBR regime, I also use cross-sectional variation in boundness to the BBR, where variation comes from the performance in two fiscal indicators: net operating surplus and the level of own funds. I find Swedish municipalities to be highly consumption sensitive in general. During time period 2001-2011 when the BBR is in place, a one percentage increase in predicted current revenues leads to a 0.74-0.76 percentage increase in current consumption. Before the implementation of the BBR, time period 1996-1999, a one percentage increase in predicted current revenues leads to a 0.83-0.87 percentage increase in current consumption. A possible explanation for the decreased consumption sensitivity is that municipalities before the BBR implementation were primarily upward sensitive, i.e. when revenues were expected to rise, expenditures followed, while after the BBR, municipalities are pri-

[1] For example, Germany, Japan, Netherlands, France, New Zealand, Switzerland, Sweden, Canada, Finland, Norway, Denmark, Korea, Portugal and Turkey have some variation of a BBR on the local level. See Sutherland et al. (2005) for a review on local fiscal institutions in OECD countries.

marily downward sensitive, i.e. when revenues are expected to decline, expenditures follows. This possible explanation also agrees with the simple descriptive evidence that the aggregate municipality sector deficit has turned into a surplus, and that the number of municipalities with deficits has decreased, since the implementation of the BBR. In the heterogeniety analysis I find municipalities that perform well in both fiscal indicators (net operating surplus and own fund level) to be more consumption smoothing than municipalities that do not perform well in either. This result implies that budget balance plays a role for intertemporal consumption behavior.

There is a continuous public debate on the long-run sustainability of government debt, and indeed, if politicians are opportunistic there will be a need to impose restraints on fiscal decision making. In Persson and Svensson (1989), and in Alesina and Tabellini (1990), incumbent politicians accumulate more debt when they are less certain of being reelected, since the inherited debt will constrain the decision making of the successive adversary government. In Alesina and Tabellini (1990) the parties disagree over the *composition of* spending, which leads to the conclusion that both left-wing and right-wing governments act strategically by issuing more debt when facing electoral defeat or term limits. In Persson and Svensson (1989) however, only right-wing governments increase spending and debt strategically, since the disagreement is over the *level of* spending.[2] Debt accumulation in the local public sector can also be a matter of moral hazard between central and local jurisdictions; local jurisdictions will take on more financial risk if they expect that the central government will bail them out. This so called "soft budget effect" is found to be economically substantial in Swedish municipalities in a study by Pettersson-Lidbom (2010), who uses data from a time period (1979-1992) when there was a discretionary municipal financial help program established by the national government. According to the results, a municipality that expects to be "bailed out" by the financial help program increases it's debt by 20 percent.

The implementation of a BBR can correct the inefficiencies in the opportunistic and strategic decision making described in the models above, but the BBR can also introduce other types of inefficiencies in fiscal decision making. A BBR can prevent decision makers from acting according to all available information about future conditions as is prescribed in the tax- and consumption smoothing models. Since the possibility of deficit financing is taken away, decision makers will sometimes have to cut expenditures in order to fit the revenue costume in the short run, and instead of consumption smoothing there will be consumption sensitivity.[3] As already

[2]By empirical investigation, Pettersson-Lidbom (2001) finds that Swedish municipality decision making is strategic such as described in the model of Persson and Svensson (1989), i.e. only right-wing governments accumulate more debt when they face electoral defeat.

[3]Battaglini and Coate (2008) combines the opportunistic and the social planner perspective in a theoretical model. They establish that the gain of a BBR offsets the losses as the tax base increases in relation to the desired level of public spending.

mentioned, myopic local decision making can also have wider consequences when it comes to national stabilization of business cycles, an issue examined in Wibbels and Rodden (2004). If local public sector revenues decrease during a recession, either because the national government decides to cut funding, which Wibbels and Rodden (2004) find to often be the case; or because tax revenues are tied to the level of economic activity, a BBR can contribute to pro-cyclical policies such as increased taxes or expenditure cuts. Pro-cyclical responses in local sector public finances is widespread among OECD countries according to the empirical results in Wibbels and Rodden (2004).[4]

Using the variation in BBR strictness in U.S states, Alesina and Bayoumi (1996) find that BBR's reduce average deficits, but they also reduce budget flexibility in that they suppress the automatic stabilizing effect of surpluses and deficits. The loss of budget flexibility does not however seem to effect state product variability. Also using data on U.S states, Bohn and Inman (1996) find that states with stricter BBR's have a greater propensity to cut spending in order to avoid running deficits. Poterba (1994) finds that U.S states with stricter BBR's and with a low level of funds, adjust more quickly to negative revenue shocks. Clearly, BBR's have been empirically found to have substantial consequences for fiscal policy, consequences that can be deemed positive or negative depending on whether the legislation corrects political distortions or distorts forward-looking behavior.

In this paper I apply the social planner perspective and ask whether a BBR distorts forward-looking behavior in the sense of generating consumption sensitivity to revenue. Consumption sensitivity can be quantified using the λ-model, developed by Campbell and Mankiw (1990) in order to empirically test the prediction of the permanent income hypothesis.[5] The parameter λ estimates consumption smoothing (sensitivity), on a range from 0 to 1, with low (high) values of λ implying a high degree of consumption smoothing (sensitivity). My study belongs in a literature where the λ-model has been used to study the role of fiscal and political institutions in generating myopic public policies.

First, I study consumption sensitivity in Swedish municipalities in general during a time period when there has been a BBR in place. Second, I split the sample of Swedish municipalities into groups according to fiscal indicators: own fund level and the net operating surplus, and study heterogenous sensitivity behavior. In similar spirit to Borge and Tovmo (2009), I assume that the performance in these two fis-

[4]An OECD study finds that in about half of the OECD countries, sub-national governments responded in a pro-cyclical manner in the latest financial crisis, while the rest of OECD members either responded passively, or actively to counter the downturn, see Blöchliger et al. (2010)

[5]The fundamental result in the permanent-income hypothesis is similar to the tax smoothing model of Barro (1979). Namely, that policy makers should use all available information about future conditions and keep policy smooth over time. The difference between the two approaches lies in the objective function and the policy instruments.

cal areas represent different degrees of boundness to the BBR. Using this strategy in order to study the Norwegian local BBR, Borge and Tovmo (2009) find that a strong performance in three fiscal indicators (net operating surplus, revenue level, and own funds; separately) is associated with more forward-looking behavior, i.e. less consumption sensitivity. Borge and Tovmo (2009) also discuss the difference between being inherently myopic and being liquidity constrained. They split the sample according to party fragmentation, their proxy for myopia, and find that municipalities with a higher fragmented local council are more consumption sensitive. The conclusion is that heterogenous behavior in intertemporal consumption behavior is determined both by inherent myopia and by liquidity constraints. In this current study I do not make any explicit distinctions between myopia and constraints. Another difference between my approach relative to Borge and Tovmo (2009) is that I will study two fiscal indicators, own fund level and net operating surplus, not only separately but also combined. Furthermore, in the Swedish case, I do not have to make an (as strong) assumption that the own fund level can be treated as a constraint, since the BBR framework allows more discretion in terms of deficit financing for well funded municipalities.[6] Finally, I compare the BBR period estimates of consumption sensitivity with the estimates on the time period before the BBR was implemented.

Holtz-Eakin et al. (1994) were the first to apply the λ-model to public finances. Using aggregate data, they estimate λ to be close to 1 in U.S. state and local governments, and the permanent income hypothesis is thus rejected. Subsequent studies using the λ-model use microdata, such as Dahlberg and Lindström (1998) who use Swedish municipality data from period 1974-1987 in order to estimate a value of λ. The permanent income hypothesis is rejected for Swedish municipalities during this time period, and with labor expenditures as the outcome variable. But the deviation from the consumption smoothing ideal is very small, as only 10 percent of revenue changes transfer into consumption. In Borge et al. (2001) the hypothesis of forward-looking behavior is not rejected for the pooled sample of Swedish municipalities, but the specification test rejects the model. In the heterogeniety analysis, high revenue municipalities are found to be more smoothing than medium and low revenue municipalities, but all three estimates of λ are low at 0.1-0.18.[7] A further study using the λ-model is Donovan (2009), where, for example, decision makers in U.S. local governments that face term limits are found to be more consumption sensitive. In

[6] Even if the financial position of a municipality is favorable after taking debts, risk exposure and liquidity into account, the government urges municipalities to be very restrictive in the use of deficit financing. For more information read the Government bill 2003/04:105, Swedish Ministry of Finance.

[7] However, in the sensitivity analysis with varying instrument set, estimates as high as 0.96 are found as well, and the relationship between the level of revenues and smoothing behavior is reversed when expenditures are used as instruments instead of revenues.

Solé-Ollé and Viladecans-marsal (2011), Spanish local government consumption is found to be considerably sensitive to revenue changes in general, and during times and at places where there is a housing boom. In summation, the above literature has focused on explaining variation in smoothing behavior, studying the effects of fiscal status, fiscal rules and political economy factors. But a clear general result is that the hypothesis of forward-looking local government officials is often rejected.[8]

The traditional view is that budget balance laws are more suitable on the local level than on the central level, since the central government needs even more flexibility in order to manage active stabilization policies.[9] However, the increasing awareness of the structural budget problems in the United States has reopened the floor to discuss a federal BBR, see Azzimonti et al. (2010). Even if the BBR primarily stays a local public sector specific phenomenon, examining it is still highly relevant since sub-national governments are responsible for 31 percent of public expenditures; expenditures that are worth 15 percent of total GDP (in OECD averages). Recognizing that sub-national governments are vital contributors to national structural budget reform, this paper contributes to the overall discussion on the role of fiscal institutions in guaranteeing long-run fiscal stability.

In the following section 2, I present the theoretical model, including an application with liquidity constraints. I continue by explaining the choice of empirical method in section 3. I describe the environment of the Swedish local sector and present descriptions of the data in section 4. In section 4.1. I explain the design of the Swedish BBR and discuss the developments of fiscal indicators since the implementation. The estimates of λ are presented in the results section, 5, where I also discuss the role of the BBR by comparing fiscally strong and weak municipalities.

2 Theoretical Framework

In this section, I first present the theory of intertemporal maximizing behavior, applied on a representative individual of government with full access to credit markets. This framework is used in, among others, Holtz-Eakin et. al and Dahlberg and Lindström (1998)[10]. In the following section, I will present a revision of the optimal intertemporal result in the presence of a BBR, following the liquidity constraint

[8]The results on the pooled sample of Norwegian, Danish and Swedish municipalities in Borge et al. (2001) are an exception, but the model specification is rejected by the Sargan test in all three cases.

[9]See for instance, Alesina and Perotti (1996). Empirical research has also shown that local and state governments are less revenue smoothing than the federal counterpart. See for example Huang and Lin (1993), and Bohn (1998) on U.S. federal government data, and Hallerberg and Strauch (2002) and Arreaza et al. (1998) on European data. See Sorensen et al. (2001), Holtz-Eakin et al. (1994) and Strazicich (1997) for empirical work in the state and local level.

[10]The approach is similar to the tax smoothing model in Barro (1979), but differs in the objective function.

example of Zeldes (1989).

2.1 The Permanent Income Hypothesis

In the theoretical model, a representative individual of the municipality maximizes discounted utility from private and public goods, subject to intertemporal budget constraints. Since the primary focus is on intertemporal behavior, I make a simplifying assumption that agents are homogenous within the jurisdiction. Preferences are described by a time-specific CRRA utility function, that is additively separable in the public good G_t, and the private good C_t.

$$U(G_t, C_t) = \frac{G_t^{1-\theta}}{1-\theta} + \frac{C_t^{1-\gamma}}{1-\gamma}, \qquad \theta, \gamma > 0. \tag{1}$$

The intertemporal elasticities in public and private consumption respectively, are $1/\theta$ and $1/\gamma$. The government budget constraint in per capita terms is expressed as

$$G_t = \tau_t Y_t + F_t + A_t - \frac{A_{t+1}}{1+r_{t+1}}, \tag{2}$$

where A_t are assets at the beginning of time t, $\tau_t Y_t$ is tax revenue and F_t includes user fees and intergovernmental grants. According to the budget constraint, there is a possibility to cover current expenditures with the issuance of new debt $A_t - \frac{A_{t+1}}{1+r_{t+1}}$, or to save for the future. Labor supply, Y_t, is assumed to be exogenous.

The individual budget constraint is in principle similar,

$$C_t = (1-\tau_t)Y_t + K_t - \frac{K_{t+1}}{1+r_{t+1}}, \tag{3}$$

where K_{t+1} is private assets at the beginning of period $t+1$, which yields the same interest r_{t+1} as on government assets. The after tax income is $(1-\tau_t)Y_t$.

The representative individual maximizes the sum of discounted flow of utility in equation (4) subject to the government budget constraint (2), the private budget constraint (3), and the No-Ponzi-Scheme condition, which says that the individual cannot consume more than the full discounted stream of income and wealth.[11]

$$max \quad E_t \left[\sum_{s=0}^{\infty} (1+\rho)^{-s} U(G_{t+s}, C_{t+s}) \right] \tag{4}$$

The solution to the maximization problem is represented by two separate Euler equations, one for the public good G_t, and one for the private good C_t.

[11]Which is: $\lim_{j\to\infty} \frac{A_{t+j}}{\prod_{s=0}^{j} R_{t+s}} = 0$

$$E_t\left[\left(\frac{1+r_{t+1}}{1+\rho}\right)\left(\frac{G_{t+1}}{G_t}\right)^{-\theta}\right]=1 \tag{5}$$

$$E_t\left[\left(\frac{1+r_{t+1}}{1+\rho}\right)\left(\frac{C_{t+1}}{C_t}\right)^{-\gamma}\right]=1 \tag{6}$$

The Euler equations describe a local representative agent who behaves in a consumption smoothing manner. Since there is decreasing marginal utility of consumption, the agent would not like to consume different amounts at different times, other than what is determined by the difference between the interest rate r_t and the rate of time preferences ρ. Depending on whether the real interest rate is larger or smaller than the rate of time preference, consumption will either increase or decrease over time. The additive separability assumption allows me to focus on the first order condition of public consumption in equation (5) independently of private consumption. As shown in Hansen and Singleton Kenneth J. (1983), the Euler equation can be simplified by assuming joint lognormality and homoskedasticity in the real interest rate.

$$E_{t-1}(\Delta \ln G_t)=\mu+\frac{1}{\theta}E_{t-1}(r_t) \tag{7}$$

According to equation (7), the expected change in local government consumption depends on a constant[12] and expectations about the interest rate. The main lesson to take away from equation (7) is that expected current consumption growth is determined independently of expected growth in current revenues. According to the permanent income hypothesis, all expected revenues changes are already taken into account in the consumption decision at time $t-1$, and therefore only unexpected revenue changes will affect consumption, and then only to the degree that they reflect changes in the expected future revenue stream. For the local representative agent this implies that local consumption will only change when the forecast over future revenues changes. In other words, according to equation (7) above, it is not possible to use $t-1$ information about changes in current revenues at time t to predict consumption changes at time t. In the empirical strategy I will test this statement by inserting $\Delta \ln R_{it}$ in equation (7).

2.2 With a balanced budget rule

In this section I will make use of the liquidity constraint literature in order to illustrate how a BBR changes the first order condition of the permanent income hy-

[12] $\mu=(1/\theta)\{\ln(1+\rho)^{-1}+\frac{1}{2}var[\ln(1+r_t)-\theta\ln(G_t/G_{t-1})]\}$

pothesis. Studying the impact of liquidity constraints for individuals, Zeldes (1989) introduced a sequence of borrowing constraints such as the one in equation (8).

$$A_{t+1} \geq 0 \tag{8}$$

The constraint is a floor on assets, restricting them to be zero or positive. If $A_{t+1} > 0$, the agent is able to accumulate savings in t and use them for consumption at time $t+1$, but is not able to borrow against future labor income. The one-sided borrowing constraint changes the government budget constraint into the following,

$$G_t \leq \tau_t Y_t + F_t + A_t. \tag{9}$$

To this budget constraint I associate a Kuhn-Tucker multiplier ϕ_t, and again solve the maximization problem to get the following

$$G_t^{-\theta} = \left(\frac{1+r_t}{1+\rho}\right) E_t(G_{t+1}^{-\theta}) + \phi_t \tag{10}$$

If the constraint is not binding, such that $A_{t+1} > 0$ and $G_t = \tau_t Y_t + F_t + A_t - \frac{A_{t+1}}{1+r_{t+1}}$, I also must have that $\phi_t = 0$. And looking at the result in (10), it is clear that the necessary condition for optimization is fulfilled. The municipality is able to save in period t in order to use in period $t-1$ and can thereby smooth consumption. If however, the constraint is binding, such that end of period assets is zero, $A_{t+1} = 0$, and $G_t = \tau_t Y_t + F_t + A_t$, it also must be the case that $\phi_t > 0$. With this double-sided constraint, a municipality is not allowed to accumulate savings at time t in order to consume at time $t+1$, nor is it allowed to borrow against future income.

In the literature on individual liquidity constraints it is practice to use the level of individual funds as a proxy for being liquidity constraint, se Zeldes (1989). I will apply the same practice on the Swedish municipality sector, and divide into groups according fiscal indicators such as the level of own funds and the level of the net operating surplus. A municipality which performs poorly in these indicators is assumed to be bound by the BBR, whereas a municipality that performs well is not. The Swedish BBR is constructed so that a municipality is not allowed to make use of deficit financing, which implies that neither saved, nor borrowed, funds are allowed as financing of current consumption, in general. A municipality that faces a binding BBR confronts a sequence of binding constraints as in (8). When $A_t = 0$ for all t we have the following simplified budget constraint,

$$G_t = \tau_t Y_t + F_t \tag{11}$$

A municipality with a low level of funds does not smooth consumption. Instead, it acts as if there is no access to capital markets, and consumes hand-to-mouth.[13] Well funded municipalities face the non-binding constraint in (8), meaning that they are allowed to use saved assets in order to finance a deficit. A municipality with a high structural surplus - consistently high net operating surpluses year after year - will rarely run a deficit, instead, consumption smoothing implies a temporary decrease in the surplus. A high surplus or a high level of own funds are two phenomenon that - through their own individual logic - offers policy makers a way of obtaining the consumption smoothing optimum.

3 Empirical Method

The λ-model is obtained by modification of the logarithmic euler equation (7) from the theory section. The parameter λ is included as a coefficient on expected current revenues in the logarithmic euler equation (7), where current revenues is $R_t = \tau Y_t + F_t$. The resulting weighted function is referred to the λ-model,

$$E_{t-1}(\Delta \ln G_t) = (1-\lambda)\mu + \lambda E_{t-1}(\Delta \ln R_t) + (1-\lambda)\frac{1}{\theta}E_{t-1}(r_t) \tag{12}$$

The null hypothesis is that the representative individual of the municipality is forward-looking, which is when the coefficient on $\Delta \ln R_t$ is zero. Remembering the theoretical discussion, forward-looking behavior implies that consumption grows independently from the growth in predicted current revenues. If I cannot reject that $\lambda = 0$, I can conclude that consumption growth is determined by permanent revenues. If λ is significantly different from zero I say that municipality consumption is determined by predicted current revenues. The size of the estimate tells me to what extent behavior deviates from the smoothing ideal.

The parameter λ is estimated using the empirical model below.

$$\Delta \ln G_{it} = \beta_t + \lambda \Delta \ln R_{it} + \varphi \Delta X_{it} + \epsilon_{it} \tag{13}$$

The equation contains time fixed effects β_t, which captures all changes in consumption that is common to all municipalities within each year, such as changes in the interest rate. The time fixed effect can be interpreted as a common shock. The error term ϵ_{it} is assumed to be an entity specific shock which contains information about future resources. Since the population composition and size affects both consumption and revenues both directly, and indirectly through the intergovernmental grant

[13] Incentives to save in order to finance capital projects with own assets, or to decrease assets to debts ratios, are not modeled in this theoretical framework, but do play a role in the Swedish municipality sector.

system, I have included demographic controls in ΔX_{it}. The size and composition of demographics constitute the quantity demanded from municipality services, so that when demographics change and municipality consumption does not respond, the result will be a change in the quality of the services. The model with demographic controls therefore promotes the notion that municipalities want to smooth consumption holding demographics constant, such that the quality of services is constant in the short-run.

The informational shock ϵ_{it} about permanent revenues is likely correlated with current revenues $\Delta \ln R_{it}$, and therefore it is not possible to consistently estimate λ using OLS. It is tempting to assume that the error term is positively correlated with current revenues, as is the case when negative shocks about permanent revenues also affect current revenues in a negative way. A positive correlation generates an upward bias in the OLS estimates. However, in theory it is not possible before hand to determine the direction of the bias. If municipalities increase user fees or taxes as responses to negative shocks, or, according to Holtz-Eakin et al. (1994), if municipalities anticipate that raising taxes decreases their tax base, the result is a negative correlation and downward biased OLS estimates.[14]

A method for solving the endogeneity problem is to use an instrumental variable that is correlated with $\Delta \ln R_{it}$, but uncorrelated with the error term. Assuming no serial correlation in the error term ϵ makes a number of instruments available in the form of lags of current revenues. For example, the assumption of no first order serial correlation in the error term implies that lagged levels of current income $t-1$ and backwards are exogenous and available as instruments. If the permanent shocks in ϵ are correlated, such that accidents/successes don't come alone, this would mean that passed realizations of revenues are correlated with future realizations of the shock. In this case past revenues are not valid as instruments, since they contain variation that is due to permanent shocks. I perform this IV-estimation using the Difference GMM estimator.[15] I use the one-step version rather than the two-step version, even though the two-step version is more efficient when there are heteroskedastic error terms. However, the efficiency gain was however small in this particular case, and the optimal weighting matrix can be problematic to estimate when the number of instruments is large in proportion to the sample size.[16] Even though the BBR was implemented in 2000, I have chosen to exclude year 2000 from the analysis since there was a different accounting structure in 1997 than in 1998 and onwards, and revenues in 1997 would therefore not be a good predictor for revenues in 2000.[17]

[14] See Donovan (2009) for further analysis.

[15] Results using the system GMM estimator are found in the Appendix.

[16] In my case, the two-step covariance matrix was not possible to invert, which makes the two-step estimates relatively unreliable, se Roodman (2009) for this discussion.

[17] The results of the specification tests improve when 2000 is excluded from the analysis.

When using lags at time $t - m$ and back as instruments, I am essentially using information about previous revenues in order to make forecasts for future revenues. An important assumption is that decision makers are aware of the revenue generating process and that they gather information about how revenues will evolve in the future given information about how they have evolved historically. A crucial condition is that the revenue generating process converges to a constant mean, or a trend, since when decision makers observe high revenues one year, they will form the expectation that the revenue level will decrease and converge in following years. If there is no convergence, levels of revenues are not good predictors of how revenue will evolve in the future, and the decision makers will have a difficult time making forecasts. With difference GMM, the problem of a weakly, or non-, converging revenue process is parallel to the problem of weak instruments in regular IV-estimations.[18]

4 Swedish municipalities

The municipalities in Sweden provide basic welfare services such as: education, elderly care, child care and social care.[19] These labor intensive services absorb approximately 25 percent of all people currently employed in Sweden, and municipality expenditures make up around 15 percent of national product. Swedish municipalities are clearly important actors in the economy and in the public sector. The municipalities are run by a democratically elected assembly that in turn, in a parliamentary fashion, chooses the members of the executive board.

The data is taken from the yearly financial accounts of the Swedish municipalities. It covers the time period of 1993-2011 and includes 279 out of the current 290 municipalities.[20] The accounting system was changed in 1998, most importantly in the way pensions of municipality workers are accounted for. Data from the time period 1998-2011 can be obtained from the web site of Statistics Sweden. Data from time period 1993-1997 is supplied by Statistics Sweden, but is however not available on the web site.[21] The municipal accounts are structured in a similar way to what is practice in a private enterprize, in order words; the capital budget is separated from the operating budget. As I do not want to include investment expenditures in my consumption variable, the main variables are taken from the operating budget, and

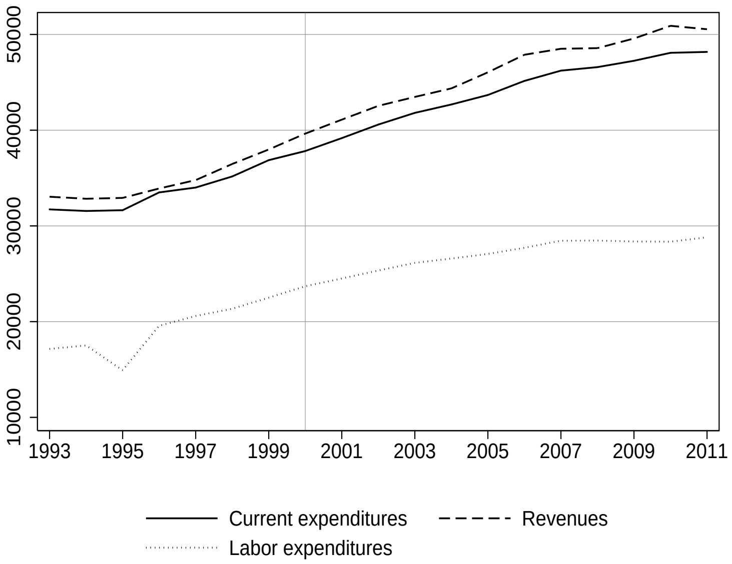
[18] See the section on unit root testing in the Appendix.

[19] Health care is provided by the regional jurisdictions.

[20] The municipalities of Gullspång and Älvdalen are excluded due to missing data. The municipalities of Nykvarn, Uppsala, Knivsta, Bollebyggd, Lekeberg, Södertälje, Borås and Örebro are excluded due to breakups. The municipality of Gotland is excluded since it carries regional responsibilities as well as municipal.

[21] The data from 1993-1997 is generally of lower quality, and there are some cases of suspected missing values. In 1998 the pension system changed into a fully funded system such that pensions enter the operating budget when they are "earned" and not when they are payed out, as was the case before 1998. For the sake of comparability I have added the change in the pension debt to the current expenditure variable in the data before 1998.

Figure 1: Time series of main variables in levels



Note: Per capita, 2000 prices

they are: total revenues (the dependent variable); and total current expenditures and current labor expenditures (independent variables).[22]

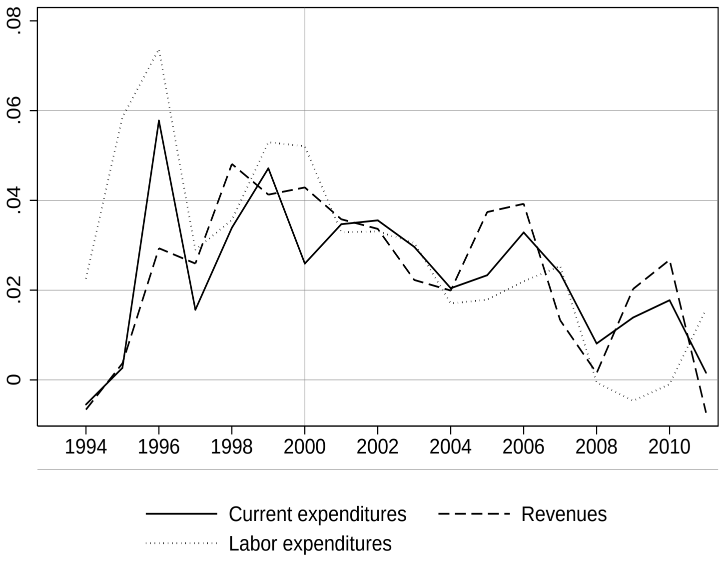
The most important part of total municipal revenues are the revenues generated by the labor income tax (65 percent). The labor income tax is set by each municipality individually and without outside restrictions. General and targeted intergovernmental grants, and user fees, are the remaining revenue sources.[23] I separately study both total current expenditures and labor expenditures as outcome variables. Wages and pensions make up the main part of the current expenditure variable, but also rents, appliances and purchases of services from private service suppliers are included. The labor expenditure variable only includes expenditures on labor hired by the municipality itself, and excludes the labor force that works in a private enterprize but that is financed by the municipality. The general hypothesis is that labor expenditures are less easily adjusted on a yearly basis than total expenditures, so that consumption sensitivity will be lower with the labor expenditure variable as the outcome.

A descriptive time series over the main variables is shown in Figure 1, where the y-axis displays yearly means for the aggregated municipality sector, in year 2000

[22]Investment expenditures only enter the operating budget as so called "write-offs", i.e. depreciating costs. Financial revenues and expenditures are excluded from the data analysis, as well as write-offs.

[23]There is an equalization system that takes into account both variation in the possibilities to raise tax revenue, and the variation in structural costs that follow with different geographic and demographic conditions.

Figure 2: Time series of main variables in changes



Note: Differences of the logarithm, per capita, 2000 prices

prices. The expenditure and revenue levels are clearly rising over time. The reason why revenues are constantly on a higher level than current expenditures is because I exclude “write-offs” (periodized investment expenditures) from the current expenditure variable.[24]

Figure 2 shows the growth rate over time in the same variables. The growth rates in both real revenues and real current expenditures are almost consistently positive; labor expenditures decrease midst financial crisis in 2009. The combination of housing market instability and loss of competitiveness of the Swedish economy contributed to the stagnation of revenues in the beginning of the 1990’s. The figure also illustrates the latest financial crisis, which had a negative impact on municipality finances during 2008 and 2009. In 2010 revenues increased due to a discretionary raise in intergovernmental grants and a recoil in growth of the Swedish economy. The intergovernmental grant was then phased out, which is reflected in the 2011 revenue drop. Looking closely, we see that changes in current expenditures follow these revenue fluctuations to some degree. The labor expenditure variable does not display the same degree of compliance with revenue growth. During the crisis years in 2009-2010, labor expenditures were held back at the same time as total expenditures grew. Later in 2011, labor expenditures started growing again, while both revenues and total current expenditures were stagnating.

When we look at figure 2 we are tempted to say that current expenditures are

[24]Write-offs are included in the net operating surplus variable

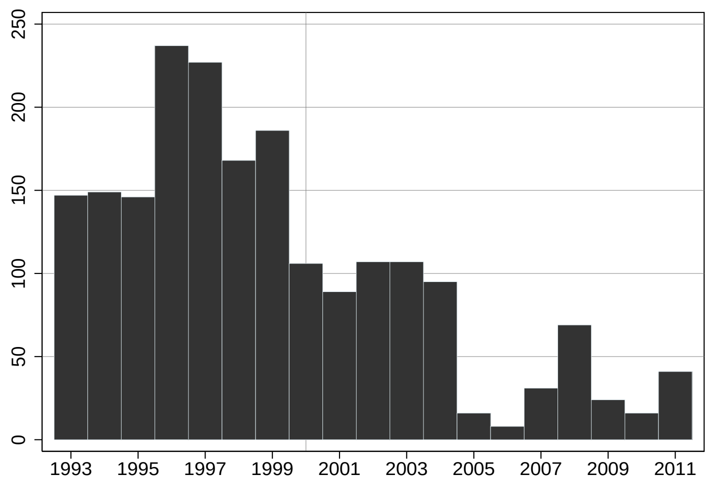
fairly sensitive to changes in current revenue, due to the somewhat visible compliance between the two variables. However, we cannot go further and draw the conclusion that decision makers in Swedish municipalities do not act rational and forward-looking. Since current revenue growth include both a permanent part and a transitory part, which are assumed to be correlated, we cannot say whether municipalities act myopically or forward-looking by simply looking at the correlation between the variables in figure 2. For instance, if the variation in current revenue growth is to a large degree driven by permanent shocks, the sensitivity that we observe in figure 2 will be more in line with the permanent-income hypothesis than if the variation consists mostly of transitory shocks. The empirical approach of the λ-model solves this identification problem by excluding variation in current revenues that is due to "new information" (permanent shocks) through the use of an instrument in the form of "old information".

4.1 The Swedish BBR

For years before the BBR was implemented, there were continuing bailouts of financially distressed municipalities. The bailout program was discretionary and institutionalized in the sense that there was a formal channel through which municipalities could apply for financial help from the national government. After the bailout program had ended in 1992, the financial situation for many municipalities worsened due to the national economic crisis. The fiscal framework was tightened with the implementation of the BBR in year 2000. Before the implementation, a last round of bailouts was offered in 1999 to those municipalities that for structural reasons were unable to balance their budgets. Again, the bailout program was highly discretionary and municipalities had to apply to get the extra financial aid. According to Pettersson-Lidbom (2010), the establishment of a further bailout program in 1999 suggests that the policy of "no bailouts", which was signaled with the end of the first financial aid program in 1992, was not credible. Since the BBR was implemented there have not been any further targeted bailouts to any municipalities. However, in 2010 the general intergovernmental grants were temporarily raised for all municipalities based on population size.

The Swedish BBR promotes the principle of the so called "Golden rule": current revenues should finance current expenditures, capital projects, however, can be financed by debt. The ex ante rule is that submitted budgets must be balanced. Deficits that occur ex post must be adjusted within three years. The local democratic principle is given priority in the BBR legislation, i.e. local representatives are fiscally responsible to the local electorate and not to the national government. The Swedish central government does not have any enforcement instruments, and municipalities still have access to financial markets on their own terms. There are some situations where municipalities are exempted, either from submitting a balanced budget, or from correcting an occurred deficit. One of these exceptions is when a municipality already has a sufficiently high level of own funds. Municipalities are urged to thoroughly motivate omissions from the BBR and, in general, to invoke exceptions very restrictively.

Figure 3: Number of municipalities with deficits



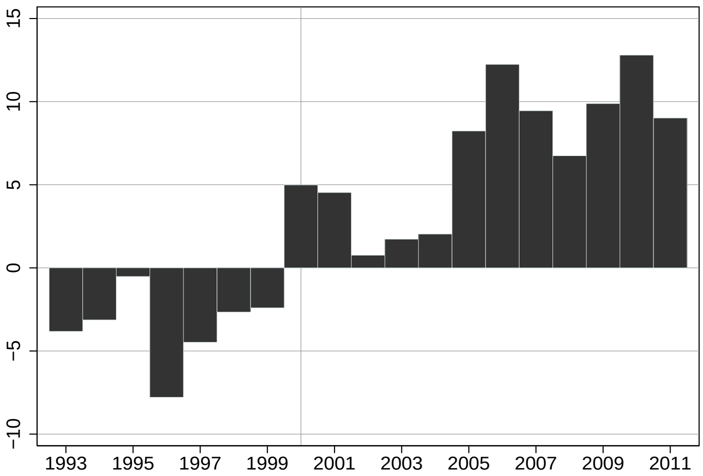
Note: Deficits according to the net operating surplus in billions of SEK, nominal prices

Figure 3 shows the number of municipalities with deficits over time.[25] The worst year in terms of deficits was 1996, when 237 out of 279 municipalities had occurred deficits. During the BBR implementation year of 2000 the number of unbalanced municipalities has decreased to 106, which is less than half of all municipalities in the sample. Deficits are clearly more rare from 2005 and onwards, and in 2006 only 8 municipalities had deficits. During the financial crisis in 2008 the number of unbalanced municipalities increased, but in the following years, when the intergovernmental grants were raised, the number of unbalanced municipalities decreased again. The overall decrease in the number of deficits since the implementation of the BBR is reflected in the increasing net operating surplus of the aggregated municipality sector in figure 4. The aggregate net operating surplus was negative until the year of BBR implementation in year 2000 and remains positive from there on. Again, 1996 was the worst financial year with a deficit of almost 8 billion SEK (nominal prices). The surplus in 2010, though, was almost 13 billion SEK (nominal prices).

The two figures above show that the Swedish municipality sector has reduced the number of deficits and increased the aggregate net operating surplus since the implementation of the BBR. At least in the aggregate, it seems as if the "no bailout"

[25] I use the net operating surplus excluding extraordinary revenues and expenditures

Figure 4: Aggregate net operating surplus of the municipality sector



Note: Net operating surplus in billions of SEK, nominal prices

threat that is implied within the BBR legislation has been credible to some extent. A balanced budget, however, is not a goal in itself. The primary aim of the legislation is to stabilize the long-term financial outlook in the sector, implying that municipalities that already have a high level of own funds are less bound by the BBR.[26] Remember also, that municipalities with consistently high net operating surpluses can sustain the expenditure level and simply let the surplus decrease temporarily when revenues are expected to decline. A municipality can thus achieve consumption smoothing with either a high level of own funds or a high level of structural surplus. In the subsequent heterogeniety analysis I create groups using the mean level of own funds and the mean net operating surplus, during the time period studied, 2001-2011. 50 percent of the best performing municipalities in terms of mean own level of funds is placed in the group called "high" and the remaining 50 percent is placed in the group called "low".[27] The same procedure is performed using the mean net operating surplus as fiscal indicator. I analyze heterogenous effects using these two fiscal indicators, both separately and combined.

Table 1 shows summary statistics on relevant variables for two groups of municipalities. A municipality qualifies into the "high" group if it is in the best performing group according to *both* indicators, the reverse holds for the "low" group. The whole

[26] Government bill 2003/04:105, Swedish Ministry of Finance

[27] The regulatory guidelines over the BBR refer specifically to municipalities as "fiscally strong" if, at a minimum, assets, material and liquid, are positive net of all debts, including all future pensions payments, and this is the definition I use when creating groups according to own funds. Municipalities should also take risk exposure and liquidity into account when assessing whether they qualify for making an exception.

Table 1: *Descriptive statistics between "low" and "high" performing municipalities according to both indicators*

Variable	**High**	**Low**	**Difference**
Current expenditures	42688	46420	-3732***
Labor expenditures	25697	28730	-3033***
Revenues	44991	48450	-3459***
Net operating surplus	953	261	692***
Own funds	13598	-5843	19441***
Population	41188	15115	26073***
Share of 1-19	0.232	0.224	0.008***
Share of 65+	0.187	0.217	-0.030***
Observations	*92×11*	*92×11*	

* p<0.1, ** p<0.05, *** p<0.01
Per capita, 2000 prices

sample of municipalities is thus not represented in table 1. There are 92 municipalities in each group.[28] Table 1 illustrates some differences between the two groups of municipalities. The "high" group obviously has a higher level of own funds and a higher net operating surplus, whereas the level of own funds is negative in the "low" group. Expenditures and revenues are higher in the "low" group, which signals that this group has a more demanding expenditure structure, such as: older and smaller populations.

5 Results

In section 5.1 I present general results on consumption smoothing under a BBR. In the subsequent sections I discuss the role played by the BBR by first studying heterogenous effects across groups of municipalities in section 5.2, and then in section 5.3, by comparing estimates right before and right after the implementation of the BBR, and with earlier studies on Swedish data.

5.1 General results

In this section I present the main results on consumption smoothing in Swedish municipalities under a BBR. A high estimate of λ suggests a high degree of consumption sensitivity, whereas a low or statistically insignificant estimate suggests consumption smoothing. The results with total current expenditures as the outcome variable are shown in table 2. According to both the OLS and the difference GMM results, Swedish municipalities are considerably consumption sensitive, and do not

[28] A descriptive analysis based on the two fiscal indicators separately, is placed in the Appendix.

in general act as forward-looking agents. The estimate of λ is 0.76, in the difference GMM model with demographic controls.[29] The interpretation of the estimate is as follows: an expected change in revenue will be accompanied by a change in current expenditures to the extent of 76 percent of the revenue change. In order words, the λ-estimate can be interpreted as an elasticity of consumption to revenue; a one percentage increase (decrease) in revenue generates a 0.76 percentage increase (decrease) in expenditures. The GMM estimate without demographic controls is somewhat lower, however, the results of all four models indicate that municipalities adjust current expenditures to fit the revenue costume - even though the revenue fluctuation is expected and temporary. Later on in section 5.3, I will show that these estimates are high in comparison with results in earlier studies with Swedish data. It is also a fairly high estimate when comparing with international studies on pooled samples, although just as high estimates have been found when looking at heterogenous effects.[30]

Table 2 also show that the Arellano-Bond serial correlation tests reject the hypotheses of no serial correlation of first and second order, and accordingly, these lags are excluded from the analysis. The results do not change in a noticeable way when varying the instrument set.[31] The null hypothesis of correct model specification and instrument exogeniety is not rejected by the Hansen test, however, since the Hansen p-value is sensitive to the number of instruments and has low power, the test should be interpreted with caution. The Sargan test of model specification is not sensitive to the number of instrument, but is, however, not heteroskedasticity robust.[32]

The OLS estimates are smaller than the GMM estimates, which implies a negative correlation between the shock to permanent resources and the change in current resources. A negative correlation arises when municipalities somehow raise current revenues, through taxes or user fees, when they receive negative shocks about the future, or according to Holtz-Eakin et al. (1994), if there are municipality expectations that increases in taxes and user fees will lead to a loss of future tax base. Intuitively, it might seem more reasonable that negative shocks about the future are reflected negatively unto today as well (and vice versa for positive shocks) such that OLS estimates will be upward biased. Downward biased OLS-estimates have, however, been the case in several of the aforementioned studies using the λ-model, and the finding might make more sense considering that macroeconomic variation that

[29]The demographic controls are logs of total population, share of people in ages 1-19; and share of people in ages 65 and above.

[30]Earlier estimations of λ: 1.01 (Holtz-Eakin et al. (1994)), 0.60 (Solé-Ollé and Viladecans-marsal (2011)), 0.64 (Donovan (2009)) and 0.35 (Borge and Tovmo (2009)) The null hypothesis of $\lambda = 0$ is not rejected for the pooled sample of Norwegian, Danish and Swedish municipalities, separately, in Borge et al. (2001).

[31]In the Appendix I present sensitivity checks with respect to the number of instruments included.

[32]se Roodman (2009) for an extensive discussion on this.

Table 2: *Full sample estimation of λ during 2001-2011 with total expenditures as outcome variable*

	(1) OLS	(2) OLS	(3) GMM	(4) GMM
λ	0.654***	0.653***	0.738***	0.761***
	(0.0133)	(0.0134)	(0.0792)	(0.0613)
Demographic controls	No	Yes	No	Yes
Observations	3069	3069	3627	3627
Hansen p-value			0.240	0.205
Sargan p-value			0.023	0.018
AR1 p-value			0.000	0.000
AR2 p-value			0.000	0.000
AR3 p-value			0.182	0.169

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
Lags 3-5 of log level revenues are used as instruments
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

is common for all municipalities has been removed by including year dummies.[33]

Table 3: *Full sample estimation of λ during 2001-2011 with labour expenditures as outcome variable*

	(1) OLS	(2) OLS	(3) GMM	(4) GMM
λ	0.149***	0.139***	-0.662**	0.221
	(0.0208)	(0.0208)	(0.323)	(0.135)
Demographic controls	No	Yes	No	Yes
Observations	2959	2959	3497	3497
Hansen p-value			0.817	0.820
Sargan p-value			0.001	0.153
AR1 p-value			0.176	0.212
AR2 p-value			0.684	0.623
AR3 p-value			0.611	0.749

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
Lags 3-5 of log level revenues are used as instruments.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

I continue by showing the results from the λ-estimations using labor expenditures as the outcome variable. The hypothesis is that labor expenditures are less sensitive to revenue changes than total expenditures, since hiring someone is a more long-term commitment. The estimation results with labor expenditures as outcome variable

[33] The OLS bias direction is in line with earlier findings in Holtz-Eakin et al. (1994), Solé-Ollé and Viladecans-marsal (2011), Borge and Tovmo (2009), and partly Donovan (2009). It is however not in line with earlier studies on Swedish data such as Dahlberg and Lindström (1998) and Borge et al. (2001).

are shown in table 3.[34] From the difference GMM results with demographic controls, we can conclude that labor expenditures are much less sensitive to revenue changes than total expenditures, i.e. labor expenditures are more smooth. The estimate of λ is 0.219 and (barely) not statistically significant.[35] However, when looking at the estimate without demographic controls the estimate is largely negative and statistically significant at the 5 percent level. The interpretation of a negative result is that expenditures on labor decrease when expected current revenues increase. This would be the case if municipalities are conducting active labor market stabilization policies, but it is likely not the reason behind these findings.[36] Focusing on the difference GMM estimate with controls and the OLS estimates, that are statistically significant but small in size, the results are in line with the hypothesis that labor expenditures are less sensitive to predicted revenue fluctuations than current expenditures.

5.2 Heterogenous effects

In order to discuss whether the BBR has a role in inducing consumption sensitivity in Swedish municipalities, I split my sample according to two fiscal indicators - the net operating surplus and the level of own funds - and study heterogenous effects. The rationale behind this set-up is as follows: municipalities that are already low in own funds cannot use deficit financing to cover current expenditures without infringing the principles of the BBR legislation; well funded municipalities have more room for discretion. However, having a high level of own funds is not the only way by which a municipality can reach the consumption smoothing optimum. By sustaining a high level of net operating surplus, consumption smoothing can be practiced by letting the surplus decrease without hitting the lower zero bound. In the theory section, I showed that a borrowing constraint is equivalent to restricting municipalities to consume only the amount of resources that are given each year, and therefore I expect to see a higher value of λ (higher consumption sensitivity) in the group of badly performing municipalities, for whom the BBR is binding.

In table 4, I show the results from two separate estimations, each including one of the fiscal indicator variables, fully interacted with all the righthand side vari-

[34]Another ten municipalities are dropped from the estimations because of missing values on labor expenditures. Since the estimations with total expenditures are considered my baseline results, I have decided to keep these ten municipalities in those estimations, so that the sample size is not diminished.

[35]Despite that the Arellano-Bond autocorrelation tests do not reject the hypothesis of no serial correlation of first and second order, I will use the same instrument set, and the same time period, as in the estimations with total expenditures.

[36]It seems as if population growth is the sole driving force behind the difference between the two models, and that population growth is positively correlated with predicted revenues but negatively correlated with labor expenditures. An explanation behind the negative result could be that municipalities which are growing in population size, are also transferring more and more services to the private sector, which decreases their own expenditures for labor.

Table 4: *Heterogenous effects during 2001-2011 with total expenditures as outcome variable*

	(1) OLS	(2) OLS	(3) GMM	(4) GMM
		Own funds		
λ	0.637***	0.631***	0.532***	0.705***
	(0.0198)	(0.0200)	(0.170)	(0.0930)
Low	0.0357	0.0424	0.328*	0.126
	(0.0268)	(0.0270)	(0.189)	(0.117)
Demographic controls	No	Yes	No	Yes
Observations	3069	3069	3627	3627
Hansen p-value			0.358	0.298
Sargan p-value			0.351	0.354
AR1 p-value			0.000	0.000
AR2 p-value			0.000	0.000
AR3 p-value			0.246	0.166
		Surplus		
λ	0.586***	0.582***	0.714***	0.684***
	(0.0184)	(0.0186)	(0.0857)	(0.0775)
Low	0.145***	0.150***	0.176	0.193*
	(0.0265)	(0.0268)	(0.131)	(0.106)
Demographic controls	No	Yes	No	Yes
Observations	3069	3069	3627	3627
Hansen p-value			0.057	0.117
Sargan p-value			0.007	0.013
AR1 p-value			0.000	0.000
AR2 p-value			0.000	0.000
AR3 p-value			0.149	0.186

Clustered standard errors in parentheses

AR1-AR3 are the Arellano-Bond autocorrelation tests.

Lags 3-5 of log level revenues are used as instruments.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

ables. This approach is the same as splitting the sample and performing separate estimations for the two groups, although the model specification tests will differ. Performing the estimation with an interaction variable makes it easy to statistically test the difference between the groups. The indicator variable takes on value 1 if a municipality belongs to the *lowest* performing 50 percent, and the coefficient on the interaction variable is called "Low" in the table.

The "low" coefficient on the own fund interaction variable is positive, which supports the notion that municipalities that - through a low level of own funds - are bound by the BBR are more consumption sensitive. The estimates are substantial in economic terms; municipalities that have a higher level of own funded capital are 33 percentage points more consumption smoothing in the GMM-model without controls, and 13 percentage points more smoothing in the GMM-model with controls. Only the GMM result in the model without demographic controls is significant on the 10 percent level. The OLS estimates are statistically insignificant in substantially smaller in an economic sense. The model specification is not rejected by the Hansen, nor the Sargan, test.

The coefficient on the surplus indicator have positive coefficients in all specifications, and again; this is in line with the reasoning that high surplus municipalities can smooth by decreasing the surplus temporarily, while low surplus municipalities have to cut expenditures in order to avoid running a deficit. The OLS estimates, and the GMM estimate with controls, are statistically significant at the 1, and 10, percent level, respectively. Municipalities with low surpluses are 17-19 percentage points more sensitive, or less smoothing, than municipalities with high surpluses, according to the GMM results. However, both the Hansen and the Sargan test has very low p-values.

Since a good performance in both fiscal indicators - in their own way - offer possible ways around the BBR regime, I will combine the two indicators to get strict BBR boundness. Municipalities that have both a low level of funds, and a low level of surplus, have the least room for fiscal discretion. As long as I analyze the two fiscal indicators separately there is always the possibility that municipalities with low performance in one of the indicators are still able to smooth consumption because of good performance in the other indicator. I compare the comprehensively poorly performing group with a group of municipalities that performs well in both dimensions.

In table 5 I have generated a new indicator variable that takes on the value 1 if a municipality is in the "low" group using both indicators. The coefficient "Low" is in this case large and significant at the 10 percent level, in both the GMM estimations. In the model with demographic controls, municipalities that have consistently lower surpluses and consistently lower own funded capital consume 88 percent of a predicted revenue change, while municipalities with high surpluses and largely own funded capital stock consume only 63 percent. However, both the Hansen and the Sargan test have low p-values.

Table 5: *Heterogenous effects with both fiscal indicators*

	(1) OLS	(2) OLS	(3) GMM	(4) GMM
λ	0.577***	0.565***	0.566***	0.625***
	(0.0231)	(0.0233)	(0.161)	(0.112)
Low	0.138***	0.149***	0.340*	0.256*
	(0.0320)	(0.0322)	(0.186)	(0.137)
Demographic controls	No	Yes	No	Yes
Observations	2024	2024	2392	2392
Hansen p-value			0.105	0.107
Sargan p-value			0.024	0.029
AR1 p-value			0.000	0.000
AR2 p-value			0.000	0.000
AR3 p-value			0.360	0.313

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
Lags 3-5 of log level revenues are used as instruments
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Before the BBR

Another way of establishing the role played by the BBR is to examine consumption smoothing before the rule was implemented in 2000. Table 6 shows estimates of λ during time period 1996-1999, four years before the implementation. The results show that consumption sensitivity was higher - the estimates of λ are in the range 0.83-0.89 - right before the rule was enforced. Both the Hansen and the Sargan p-values reject the model specification at the 5 percent level, so the estimates of λ should be interpreted with caution. A possible story behind this result is that municipalities were primarily upward sensitive before the BBR was implemented, such that when revenues were expected to increase, expenditures also increased. After the BBR implementation upward sensitivity was changed into downward sensitivity, such that when revenues are expected to decrease, expenditures also decrease. This hypothesis explain both the high level of λ before and after, and the increased aggregate surplus in the municipality sector since the BBR implementation.

In Borge et al. (2001), the hypothesis of forward-looking behavior on the pooled sample of Swedish municipalities (time period 1985-1994) was not rejected, and the highest point estimate among the split samples of λ is 0.183. The results in that study are however sensitive to the number and kind of instruments included. In

Table 6: *Full sample estimation of λ during 1996-1999 with total expenditures as outcome variable*

	(1) OLS	(2) OLS	(3) GMM	(4) GMM
λ	0.743***	0.739***	0.830***	0.886***
	(0.0208)	(0.0209)	(0.140)	(0.108)
Demographic controls	No	Yes	No	Yes
Observations	1116	1116	1674	1674
Hansen p-value			0.071	0.086
Sargan p-value			0.011	0.008
AR1 p-value			0.000	0.000
AR2 p-value			0.038	0.036
AR3 p-value			0.343	0.290

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
Lags 3-5 of log level revenues are used as instruments
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

the robustness checks there are estimates that are as high as 0.96. But focusing on the baseline results in Borge et al. (2001), I draw the conclusion that consumption sensitivity has increased during the recent time period of 1996-2011 comparing with time period 1985-1994. In the study by Dahlberg and Lindström (1998), the highest estimate of λ is 0.11 during time period 1974-1987. This study only uses labor expenditures as outcome variable, and as I have shown; the results can differ greatly depending on the outcome variable.

6 Conclusion

Consumption sensitivity in the municipality sector is problematic from the general perspective of marginal utility theory. According to this perspective, a municipality should aim to smooth consumption over time. Also, if the municipality sector has a pro-cyclical revenue structure, consumption sensitivity implies a weakened local sector demand in an already dispirited economy. In this paper I ask whether the Swedish local BBR contributes to increased consumption sensitivity since it prohibits the use of deficits to finance a sustained consumption level during a revenue decline. I find that intertemporal consumption behavior deviates considerably from the consumption smoothing ideal during the time period with the BBR. Swedish municipalities consume between 74-76 percent of a predicted transitory revenue change during this time period, but labor expenditures are not as sensitive to revenues as total expenditures.

I use two fiscal indicators, own fund level and the net operating surplus, as proxies for being bound by the BBR. Municipalities that have limited access to deficit financing because of an already low level of funds, and that at the same time are in real danger of hitting the zero bound floor, are considerably more consumption sensitive than municipalities that both have high surpluses and bigger possibilities for deficit financing. Results suggest that 0.88 of predicted current revenue changes is transferred into current consumption for the low performance group, while only 0.63 is transferred into current consumption for the high performance group. This result suggests that budget balance plays a role for intertemporal decision making in Swedish municipalities.

When comparing estimates of λ before and after the implementation of the BBR, it seems that consumption sensitivity has decreased along with the implementation. This result speaks against the hypothesis that the BBR has brought increased inefficiencies in Swedish local fiscal decision making. A plausible story is that municipalities were primarily upward sensitive before, and primarily downward sensitive after, the implementation of the BBR. This hypothesis is also in line with the decrease in deficits and increase in the aggregate surplus after the BBR implementation. As mentioned earlier, in order to fully evaluate the BBR, the benefits that come from correcting political distortions, i.e. a hardened budget constraint, will have to be weighed against distortions to forward-looking behavior. In this paper I have found some indications of both benefits and drawbacks from the implementation of a BBR.

References

Alberto Alesina and Tamim Bayoumi. The costs and benefits of fiscal rules: evidence from U.S. states. *NBER Working paper series*, 5614, 1996.

Alberto Alesina and Roberto Perotti. Fiscal Discipline and the Budget Process. *The American Economic Review*, 86(2):401–407, 1996.

Alberto Alesina and Guido Tabellini. A Positive Theory of Fiscal Deficits and Government Debt. *The Review of Economic Studies*, 57(3):403–414, 1990.

Adriana Arreaza, Ben E. Sorensen, and Oved Yosha. Consumption Smoothing Through Fiscal Policy in OECD and EU Countries. *NBER Working paper series*, 6372, 1998.

Marina Azzimonti, Marco Battaglini, and Stephen Coate. On the case for a balanced budget amendment to the U.S. Constitution. *MPRA*, 2010. URL `http://mpra.ub.uni-muenchen.de/25935/1/MPRA_paper_25935.pdf`.

Robert J Barro. On the Determination of the Public Debt On the Determination of the Public Debt. *The Journal of Political Economy*, 87(5):940–971, 1979.

Marco Battaglini and Stephen Coate. A Dynamic Theory of Public Spending , Taxation , and Debt. *American Economic Review*, 98(1):201–236, 2008.

Hansjörg Blöchliger, Claire Charbit, Maria Pinero Campos, and Camila Vammalle. Sub-central Governments and the Economic Crisis: Impact and Policy Responses. *OECD Economics Deparment Working Papers*, (752), 2010.

Henning Bohn. The Behavior of U. S. Public Debt and Deficits. *The Quarterly Journal of Economics*, 113(3), 1998.

Henning Bohn and Robert P. Inman. Balanced-budget rules and public deficits: evidence from the U.S. states. *Carnegie-Rochester Conference Series on Public Policy*, 45:13–76, December 1996. ISSN 01672231.

Stephen Bond, Céline Nauges, and Frank Windmeijer. Unit Roots: Identification and Testing in Micro Panels. *Cemmap working paper CWP07/05*, 2005. URL `http://www.cemmap.ac.uk/wps/cwp0705.pdf`.

Lars-Erik Borge and Per Tovmo. Myopic or Constrained by Balanced-Budget Rules? The Intertemporal Spending Behavior of Norwegian Local Governments. *FinanzArchiv: Public Finance Analysis*, 65(2):200–219, June 2009. ISSN 00152218.

Lars-Erik Borge, Matz Dahlberg, and Per Tovmo. The intertemporal spending behavior of local governments: a comparative analysis of the Scandinavian countries. 2001. URL `http://uu.diva-portal.org/smash/get/diva2:128779/FULLTEXT01`.

John Y. Campbell and N. Gregory Mankiw. Permanent Income, Current Income, and Consumption. *Journal of Business & Economic Statistics*, 8(3):265, July 1990. ISSN 07350015.

Matz Dahlberg and Tomas Lindström. Are Local Governments Governed by Forward Looking Decision Makers? *Journal of Urban Economics*, 44:254–271, 1998.

Colleen Donovan. Direct democracy, term limits, and fiscal decisions in US municipalities. *Job market paper*, (November), 2009. URL `http://www.ocf.berkeley.edu/ colleend/DonovanJM_Nov6.pdf`.

Mark Hallerberg and Rolf Strauch. On the Cyclicality of Public Finances in Europe. *Empirica*, 29:183–207, 2002.

Lars Peter Hansen and Singleton Kenneth J. Stochastic Consumption, Risk Aversion, and the Temporal Behavior of Asset Returns. *The Journal of Political Economy*, 91(2), 1983.

Douglas Holtz-Eakin, Harvey S. Rosen, and Schuyler. Tilly. Intertemporal Analysis of State and Local Government Spending: Theory and Tests. *Journal of Urban Economics*, 35:159–174, 1994.

Chao-Hsi Huang and Kenneth S. Lin. Deficits, government expenditures, and tax smoothing in the United States. *Journal of Monetary Economics*, 31(3):317–339, June 1993. ISSN 03043932. doi: 10.1016/0304-3932(93)90051-G. URL `http://linkinghub.elsevier.com/retrieve/pii/030439329390051G`.

Swedish Ministry of Finance. God ekonomisk hushållning i kommuner och landsting. *Government Bill*, (2003/04:105).

Torsten Persson and Lars E. O. Svensson. Why a Stubborn Conservative would Run a Deficit : Policy with Time- Inconsistent Preferences. *The Quarterly Journal of Economics*, 104(2):325–345, 1989.

Per Pettersson-Lidbom. An Empirical Investigation of the Strategic Use of Debt. *Journal of Political Economy*, 109(3):570–583, 2001.

Per Pettersson-Lidbom. Dynamic Commitment and the Soft Budget Constraint: An Empirical Test. *American Economic Journal*, 2(August):154–179, 2010.

James M Poterba. State Responses to Fiscal Crises : The Effects of Budgetary Institutions and Politics. *Journal of Political Economy*, 102(4):799–821, 1994.

David Roodman. A Note on the Theme of Too Many Instruments. *Oxford Bulletin of Economics and Statistics*, 71(1):135–158, February 2009. ISSN 03059049.

Albert Solé-Ollé and Elisabet Viladecans-marsal. Local spending and the housing boom. *Documents de Treball de l'IEB*, (27), 2011.

Bent E. Sorensen, Lisa Wu, and Oved Yosha. Output fluctuations and "fiscal policy: U . S . state and local governments 1978-1994. *European Economic Review*, 45: 1271–1310, 2001.

Mark C Strazicich. Does Tax Smoothing Differ by the Evidence from Canada and the United States. *Journal of Macroeconomics*, 19(2):305–326, 1997.

Douglas Sutherland, Robert Price, and Isabelle Joumard. Sub-Central Government Fiscal Rules. *OECD Economic Studies*, 2(41):141–181, 2005.

Erik Wibbels and Jonathan Rodden. Business Cycles and the Political Economy of Decentralised Finance: Lessons for Fiscal Federalism in the EU. *Paper prepared for "Fiscal Policy in EMU: New Issues and Challenges" workshop organized by the European Commission.*, 2004.

Stephen P Zeldes. Consumption and Liquidity Constraints : An Empirical Investigation. *Journal of Political Economy*, 97(2):305–346, 1989.

7 Appendix

7.1 Descriptives

Table 7: *Descriptive statistics between "low" and "high" performing municipalities according to level of own funds*

Variable	**High**	**Low**	**Difference**
Current expenditures	43599	45390	-1791***
Labor expenditures	26535	27985	-1450***
Revenues	45806	47568	-1762***
Net operating surplus	715	433	282***
Own funds	12623	-5223	17846***
Population	39189	22017	17172***
Share of 1-19	0.231	0.229	0.002***
Share of 65+	0.194	0.208	-0.014***
Observations	*140×11*	*139×11*	

* p<0.1, ** p<0.05, *** p<0.01
Per capita, 2000 prices

Table 8: *Descriptive statistics between "low" and "high" performing municipalities according to net operating surplus*

Variable	**High**	**Low**	**Difference**
Current expenditures	42920	46052	-3132***
Labor expenditures	25978	28528	-2550***
Revenues	45279	48079	-2800***
Net operating surplus	892	261	631***
Own funds	7645	-152	7797***
Population	39264	22046	17218***
Share of 1-19	0.233	0.241	0.008***
Share of 65+	0.187	0.213	-0.026***
Observations	*139×11*	*140×11*	

* p<0.1, ** p<0.05, *** p<0.01
Per capita, 2000 prices

7.2 Sensitivity tests

7.2.1 Full sample

Table 9: SENSITIVITY TO INSTRUMENT COUNT
Full sample estimation of λ, 2001-2011
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) All
	Without demographic controls					
λ	0.732^{***}	0.748^{***}	0.738^{***}	0.724^{***}	0.735^{***}	0.691^{***}
	(0.0843)	(0.0820)	(0.0792)	(0.0796)	(0.0772)	(0.0545)
Observations	3627	3627	3627	3627	3627	3627
Hansen p-value	0.039	0.137	0.240	0.448	0.608	0.111
Sargan p-value	0.002	0.014	0.023	0.029	0.038	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.185	0.178	0.182	0.190	0.184	0.203
	With demographic controls					
λ	0.753^{***}	0.763^{***}	0.761^{***}	0.749^{***}	0.766^{***}	0.705^{***}
	(0.0665)	(0.0640)	(0.0613)	(0.0622)	(0.0596)	(0.0474)
Observations	3627	3627	3627	3627	3627	3627
Hansen p-value	0.027	0.113	0.205	0.374	0.552	0.088
Sargan p-value	0.001	0.010	0.018	0.021	0.032	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.173	0.170	0.169	0.173	0.166	0.183

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: SENSITIVITY TO INSTRUMENT COUNT
Full sample estimation of λ, 2001-2011
Labor expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) max
	Without demographic controls					
λ	-0.687*	-0.687*	-0.662**	-0.620**	-0.589**	-0.0694
	(0.355)	(0.354)	(0.323)	(0.305)	(0.296)	(0.150)
Observations	3497	3497	3497	3497	3497	3497
Hansen p-value	0.442	0.722	0.817	0.713	0.810	0.098
Sargan p-value	0.067	0.034	0.001	0.000	0.000	0.000
AR1 p-value	0.176	0.173	0.176	0.201	0.227	0.715
AR2 p-value	0.691	0.690	0.684	0.674	0.667	0.837
AR3 p-value	0.601	0.603	0.611	0.624	0.635	0.848
	With demographic controls					
λ	0.237	0.241	0.221	0.246*	0.260**	0.379***
	(0.148)	(0.151)	(0.135)	(0.126)	(0.120)	(0.121)
Observations	3497	3497	3497	3497	3497	3497
Hansen p-value	0.486	0.727	0.820	0.457	0.610	0.061
Sargan p-value	0.023	0.083	0.153	0.036	0.006	0.000
AR1 p-value	0.200	0.194	0.212	0.178	0.158	0.039
AR2 p-value	0.595	0.588	0.623	0.584	0.558	0.355
AR3 p-value	0.745	0.747	0.749	0.753	0.750	0.726

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: SENSITIVITY TO INSTRUMENT COUNT
Heterogenous effects with both fiscal indicators, 2001-2011
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) All
	Without demographic controls					
λ	0.489***	0.540***	0.566***	0.555***	0.555***	0.548***
	(0.178)	(0.176)	(0.161)	(0.155)	(0.155)	(0.114)
Low	0.416**	0.366*	0.340*	0.341*	0.341*	0.254*
	(0.201)	(0.200)	(0.186)	(0.178)	(0.178)	(0.142)
Observations	2392	2392	2392	2392	2392	2392
Hansen p-value	0.179	0.131	0.105	0.155	0.155	0.141
Sargan p-value	0.012	0.011	0.024	0.032	0.032	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.429	0.383	0.360	0.370	0.370	0.368
	With demographic controls					
λ	0.600***	0.614***	0.625***	0.605***	0.601***	0.479***
	(0.107)	(0.114)	(0.112)	(0.111)	(0.112)	(0.0951)
Low	0.280**	0.266*	0.256*	0.271**	0.284**	0.351***
	(0.133)	(0.138)	(0.137)	(0.134)	(0.134)	(0.122)
Observations	2392	2392	2392	2392	2392	2392
Hansen p-value	0.154	0.130	0.107	0.179	0.198	0.169
Sargan p-value	0.013	0.014	0.029	0.031	0.052	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.326	0.319	0.313	0.322	0.330	0.460

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12: SENSITIVITY TO INSTRUMENT COUNT
Full sample estimation of λ, 1996-1999
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) All
	Without demographic controls					
λ	0.804***	0.816***	0.830***	0.834***	0.834***	0.702***
	(0.146)	(0.143)	(0.140)	(0.139)	(0.139)	(0.0719)
Observations	1674	1674	1674	1674	1674	1674
Hansen p-value	0.044	0.173	0.071	0.038	0.038	0.015
Sargan p-value	0.001	0.008	0.011	0.004	0.004	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.041	0.039	0.038	0.037	0.037	0.043
AR3 p-value	0.372	0.359	0.343	0.339	0.339	0.524
	With demographic controls					
λ	0.865***	0.876***	0.886***	0.889***	0.889***	0.741***
	(0.113)	(0.110)	(0.108)	(0.108)	(0.108)	(0.0615)
Observations	1674	1674	1674	1674	1674	1674
Hansen p-value	0.053	0.156	0.086	0.032	0.032	0.010
Sargan p-value	0.001	0.007	0.008	0.002	0.002	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.038	0.037	0.036	0.035	0.035	0.041
AR3 p-value	0.306	0.301	0.290	0.285	0.285	0.441

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.3 Unit root testing

If the revenue generating process has a unit root, past levels of revenue are weak instruments for future realizations of changes in revenues. The advice in Bond et al. (2005) is to perform an OLS estimation, where the lagged level of revenues is regressed on the current level of revenues. In my case, it is suitable to test whether $\alpha = 1$ in the model below,

$$y_{it} = \alpha y_{it-1} + \eta_i + T_t + X_{it} + v_{it} \tag{14}$$

Where y_{it} is the level of revenues as time t, η_i is a fixed effect, T_t is a time trend, and X_{it} are demographic control variables. In table 13 I present the results from several unit root tests, using not only the first but also the third lag, which is my closest lag in the GMM estimations. All estimations of α are significantly different from one at the 0.1 percent level.

Table 13: *Unit Root tests*

	1st lag			**3rd lag**		
α	0.959***	0.707***	0.689***	0.855***	0.289***	0.278***
Time Trend		X	X		X	X
Controls			X			X
Fixed effect	X	X	X	X	X	X

* p<0.05, ** p<0.01, *** p<0.001

7.4 System GMM

Table 14: SENSITIVITY TO INSTRUMENT COUNT
Full sample system GMM estimation of λ, 2001-2011
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) max
	Without demographic controls					
λ	0.964***	0.967***	0.957***	0.950***	0.948***	0.914***
	(0.0333)	(0.0297)	(0.0277)	(0.0272)	(0.0262)	(0.0234)
Observations	3906	3906	3906	3906	3906	3906
Hansen p-value	0.041	0.081	0.165	0.312	0.482	0.042
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.101	0.100	0.102	0.103	0.104	0.113
	With demographic controls					
λ	0.932***	0.948***	0.933***	0.925***	0.923***	0.862***
	(0.0406)	(0.0346)	(0.0324)	(0.0327)	(0.0322)	(0.0298)
Observations	3906	3906	3906	3906	3906	3906
Hansen p-value	0.072	0.112	0.209	0.376	0.527	0.093
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.116	0.113	0.116	0.119	0.120	0.140

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: SENSITIVITY TO INSTRUMENT COUNT
Full sample system GMM estimation of λ, 2001-2011
Labor expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) max
	Without demographic controls					
λ	1.045***	1.069***	1.059***	1.062***	1.062***	1.104***
	(0.137)	(0.163)	(0.184)	(0.187)	(0.187)	(0.166)
Observations	3906	3906	3906	3906	3906	3906
Hansen p-value	0.017	0.098	0.113	0.113	0.113	0.074
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.086	0.084	0.087	0.087	0.087	0.079
AR3 p-value	0.810	0.805	0.810	0.809	0.809	0.793
	With demographic controls					
λ	0.491	0.421	0.404	0.411	0.476	0.568
	(0.343)	(0.424)	(0.470)	(0.477)	(0.441)	(0.355)
Observations	3906	3906	3906	3906	3906	3906
Hansen p-value	0.073	0.246	0.328	0.282	0.474	0.140
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.125	0.235	0.279	0.275	0.187	0.072
AR2 p-value	0.738	0.880	0.916	0.902	0.768	0.592
AR3 p-value	0.713	0.697	0.695	0.697	0.717	0.744

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: SENSITIVITY TO INSTRUMENT COUNT
System GMM estimation of Heterogenous effects with both fiscal indicators, 2001-2011
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) All
	Without demographic controls					
λ	0.955***	0.955***	0.943***	0.944***	0.944***	0.910***
	(0.0403)	(0.0364)	(0.0359)	(0.0367)	(0.0367)	(0.0350)
Low	0.0455	0.0454	0.0575	0.0469	0.0469	0.0341
	(0.0490)	(0.0458)	(0.0454)	(0.0442)	(0.0442)	(0.0433)
Observations	2576	2576	2576	2576	2576	2576
Hansen p-value	0.072	0.122	0.145	0.096	0.096	0.476
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.167	0.166	0.170	0.169	0.169	0.175
	With demographic controls					
λ	0.953***	0.962***	0.941***	0.941***	0.937***	0.880***
	(0.0492)	(0.0404)	(0.0411)	(0.0422)	(0.0429)	(0.0534)
Low	0.0215	0.0129	0.0333	0.0323	0.0293	0.0120
	(0.0605)	(0.0536)	(0.0542)	(0.0533)	(0.0543)	(0.0754)
Observations	2576	2576	2576	2576	2576	2576
Hansen p-value	0.075	0.119	0.139	0.122	0.179	0.439
Sargan p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR3 p-value	0.168	0.165	0.170	0.170	0.170	0.171

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 17: SENSITIVITY TO INSTRUMENT COUNT
Full sample system GMM estimation of λ, 1996-1999
Total current expenditures

	(1) 3	(2) 3-4	(3) 3-5	(4) 3-6	(5) 3-7	(6) All
	Without demographic controls					
λ	0.848^{***}	0.851^{***}	0.862^{***}	0.876^{***}	0.876^{***}	0.787^{***}
	(0.0650)	(0.0593)	(0.0555)	(0.0539)	(0.0539)	(0.0424)
Observations	1953	1953	1953	1953	1953	1953
Hansen p-value	0.149	0.317	0.196	0.102	0.102	0.002
Sargan p-value	0.001	0.006	0.007	0.005	0.005	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.026	0.026	0.026	0.025	0.025	0.030
AR3 p-value	0.324	0.322	0.311	0.298	0.298	0.400
	With demographic controls					
λ	0.784^{***}	0.794^{***}	0.820^{***}	0.852^{***}	0.852^{***}	0.750^{***}
	(0.0955)	(0.0874)	(0.0781)	(0.0735)	(0.0735)	(0.0534)
Observations	1953	1953	1953	1953	1953	1953
Hansen p-value	0.301	0.465	0.278	0.117	0.117	0.004
Sargan p-value	0.015	0.055	0.068	0.023	0.023	0.000
AR1 p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR2 p-value	0.035	0.035	0.032	0.030	0.030	0.038
AR3 p-value	0.401	0.389	0.359	0.325	0.325	0.449

Clustered standard errors in parentheses
AR1-AR3 are the Arellano-Bond autocorrelation tests.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

WORKING PAPERS
Uppsala Center for Fiscal Studies
Editor: Håkan Selin

2009:1 Sören Blomquist and Håkan Selin, Hourly Wage Rate and Taxable Labor Income Responsiveness to Changes in Marginal Tax Rates. 31 pp.

2009:2 Luca Micheletto, Optimal nonlinear redistributive taxation and public good provision in an economy with Veblen effects. 26 pp.

2009:3 Håkan Selin, The Rise in Female Employment and the Role of Tax Incentives. An Empirical Analysis of the Swedish Individual Tax Reform of 1971. 38 pp.

2009:4 Håkan Selin, Marginal tax rates and tax-favoured pension savings of the self-employed Evidence from Sweden. 32 pp.

2009:5 Tobias Lindhe and Jan Södersten, Dividend taxation, share repurchases and the equity trap. 27 pp.

2009:6 Che-Yan Liang, Nonparametric Structural Estimation of Labor Supply in the Presence of Censoring. 48 pp.

2009:7 Sören Blomquist, Vidar Christiansen and Luca Micheletto, Public Provision of Private Goods and Nondistortionary Marginal Tax Rates: Some further Results. 42 pp.

2009:8 Laurent Simula and Alain Trannoy, Optimal Income Tax under the Threat of Migration by Top-Income Earners. 26 pp.

2009:9 Laurent Simula and Alain Trannoy, Shall We Keep Highly Skilled at Home? The Optimal Income Tax Perspective. 26 pp.

2009:10 Michael Neugart and Henry Ohlsson, Economic incentives and the timing of births: Evidence from the German parental benefit reform 2007, 21 pp.

2009:11 Laurent Simula, Optimal Nonlinear Income Tax and Nonlinear Pricing: Optimality Conditions and Comparative Static Properties, 25 pp.

2009:12 Ali Sina Onder and Herwig Schlunk, Elderly Migration, State Taxes, and What They Reveal, 26 pp.

2009:13 Ohlsson, Henry, The legacy of the Swedish gift and inheritance tax, 1884-2004, 26 pp.

2009:14 Onder, Ali Sina, Capital Tax Competition When Monetary Competition is Present, 29 pp.

2010:1 Sören Blomquist and Laurent Simula, Marginal Deadweight Loss when the Income Tax is Nonlinear. 21 pp.

2010:2 Marcus Eliason and Henry Ohlsson, Timing of death and the repeal of the Swedish inheritance tax. 29 pp.

2010:3 Mikael Elinder, Oscar Erixson and Henry Ohlsson, The Effect of Inheritance Receipt on Labor and Capital Income: Evidence from Swedish Panel Data. 28 pp.

2010:4 Jan Södersten and Tobias Lindhe, The Norwegian Shareholder Tax Reconsidered. 21 pp.

2010:5 Anna Persson and Ulrika Vikman, Dynamic effects of mandatory activation of welfare participants. 37 pp.

2010:6 Ulrika Vikman, Does Providing Childcare to Unemployed Affect Unemployment Duration? 43 pp.

2010:7 Per Engström, Bling Bling Taxation and the Fiscal Virtues of Hip Hop. 12 pp.

2010:8 Niclas Berggren and Mikael Elinder, Is tolerance good or bad for growth? 34 pp.

2010:9 Heléne Lundqvist, Matz Dahlberg and Eva Mörk, Stimulating Local Public Employment: Do General Grants Work? 35pp.

2010:10 Marcus Jacob and Martin Jacob, Taxation, Dividends, and Share Repurchases: Taking Evidence Global. 42 pp.

2010:11 Thomas Aronsson and Sören Blomquist, The Standard Deviation of Life-Length, Retirement Incentives, and Optimal Pension Design. 24 pp.

2010:12 Spencer Bastani, Sören Blomquist and Luca Micheletto, The Welfare Gains of Age Related Optimal Income Taxation. 48 pp.

2010:13 Adrian Adermon and Che-Yuan Liang, Piracy, Music, and Movies: A Natural Experiment. 23 pp.

2010:14 Spencer Bastani, Sören Blomquist and Luca Micheletto, Public Provision of Private Goods, Tagging and Optimal Income Taxation with Heterogeneity in Needs. 47 pp.

2010:15 Mattias Nordin, Do voters vote in line with their policy preferences? The role of information. 33 pp.

2011:1 Matz Dahlberg, Karin Edmark and Heléne Lundqvist, Ethnic Diversity and Preferences for Redistribution. 43 pp.

2011:2 Tax Policy and Employment: How Does the Swedish System Fare? Jukka Pirttilä and Håkan Selin. 73 pp.

2011:3 Alessandra Casarico, Luca Micheletto and Alessandro Sommacal, Intergenerational transmission of skills during childhood and optimal public policy. 48 pp.

2011:4 Jesper Roine and Daniel Waldenström, On the Role of Capital Gains in Swedish Income Inequality. 32 pp.

2011:5 Matz Dahlberg, Eva Mörk and Pilar Sorribas-Navarro, Do Politicians' Preferences Matter for Voters' Voting Decisions?

2011:6 Sören Blomquist, Vidar Christiansen and Luca Micheletto, Public provision of private goods, self-selection and income tax avoidance. 27 pp.

2011:7 Bas Jacobs, The Marginal Cost of Public Funds is One. 36 pp.

2011:8 Håkan Selin, What happens to the husband's retirement decision when the wife's retirement incentives change? 37 pp.

2011:9 Martin Jacob, Tax Regimes and Capital Gains Realizations. 42 pp.

2011:10 Katarina Nordblom and Jovan Zamac, Endogenous Norm Formation Over the Life Cycle – The Case of Tax Evasion. 30 pp.

2011:11 Per Engström, Katarina Nordblom, Henry Ohlsson and Annika Persson, Loss evasion and tax aversion. 43 pp.

2011:12 Spencer Bastani and Håkan Selin, Bunching and Non-Bunching at Kink Points of the Swedish Tax Schedule. 39 pp.

2011:13 Svetlana Pashchenko and Ponpoje Porapakkarm, Welfare costs of reclassification risk in the health insurance market. 41 pp.

2011:14 Hans A Holter, Accounting for Cross-Country Differences in Intergenerational Earnings Persistence: The Impact of Taxation and Public Education Expenditure. 56 pp.

2012:1 Stefan Hochguertel and Henry Ohlsson, Who is at the top? Wealth mobility over the life cycle. 52 pp.

2012:2 Karin Edmark, Che-Yuan Liang, Eva Mörk and Håkan Selin, Evaluation of the Swedish earned income tax credit. 39 pp.

2012:3 Martin Jacob and Jan Södersten, Mitigating shareholder taxation in small open economies? 15 pp.

2012:6 Spencer Bastani, Gender-Based and Couple-Based Taxation. 55 pp.

2012:7 Indraneel Chakraborty, Hans A. Holter and Serhiy Stepanchuk, Marriage Stability, Taxation and Aggregate Labor Supply in the U.S. vs. Europe. 64 pp.

2012:8 Niklas Bengtsson, Bertil Holmlund and Daniel Waldenström, Lifetime versus Annual Tax Progressivity: Sweden, 1968–2009. 56 pp.

2012:9 Firouz Gahvari and Luca Micheletto, The Friedman rule in a model with nonlinear taxation and income misreporting. 36 pp.

2012:10 Che-Yuan Liang and Mattias Nordin, The Internet, News Consumption, and Political Attitudes. 29 pp.

2012:11 Gunnar Du Rietz, Magnus Henrekson and Daniel Waldenström, The Swedish Inheritance and Gift Taxation, 1885–2004. 50 pp.

2012:12 Thomas Aronsson, Luca Micheletto and Tomas Sjögren, Public Goods in a Voluntary Federal Union: Implications of a Participation Constraint. 7 pp.

2013:1 Markus Jäntti, Jukka Pirttilä and Håkan Selin, Estimating labour supply elasticities based on cross-country micro data: A bridge between micro and macro estimates? 35pp.

2013:2 Matz Dahlberg, Karin Edmark and Heléne Lundqvist, Ethnic Diversity and Preferences for Redistribution: Reply. 23 pp.

2013:3 Ali Sina Önder and Marko Terviö, Is Economics a House Divided? Analysis of Citation Networks. 20 pp.

2013:4 Che-Yuan Liang, Optimal Inequality behind the Veil of Ignorance. 26 pp.

2013:5 Spencer Bastani, Sören Blomquist and Jukka Pirttilä, How Should Commodities Be Taxed? A Counterargument to the Recommendation in the Mirrlees Review. 26 pp.

2013:6 Tobias Laun and Johanna Wallenius, Social Insurance and Retirement: A Cross-Country Perspective. 37 pp.

2013:7 Johannes Hagen, A History of the Swedish Pension System. 140 pp.

2013:8 Etienne Lehmann, Laurent Simula and Alain Trannoy, Tax Me If You Can! Optimal Nonlinear Income Tax between Competing Governments. 29 pp

2013:9 Tobias Lindhe and Jan Södersten, Distortive Effects of Dividend Taxation. 21 pp.

2013:10 Jonas Poulsen, After Apartheid: The Effects of ANC Power. 42 pp.

2013:11 Spencer Bastani, Using the Discrete Model to Derive Optimal Income Tax Rates. 14pp.

2013:12 Lovisa Persson, Consumption smoothing in a balanced budget regime. 39 pp.