Fiscal adjustment and balanced-budget-rules: Evidence from a Norwegian reform*

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Preliminary version, September 2014

Abstract

In Norway, central control of local government borrowing and budgeting was relaxed in 2001. Prior to 2001 budgets and borrowing in all local governments had to be approved by the central government. Since 2001, control has been more selective and applies only to local governments that have violated the balanced-budget-rule (BBR). Local governments subject to control are placed in a register (Robek). This paper investigates possible disciplinary effects of the register. The main hypothesis is that local governments that run deficits and thereby are in danger of being placed in the register will take actions to avoid this. An implication of this hypothesis is that the current deficit (fiscal balance) will be more affected by past deficits in the post-reform period than in the pre-reform period. The empirical analysis confirms a change in deficit dynamics where lagged deficits have become more important in explaining current deficits.

JEL Classification: H72, H74, H77

Keywords: Local government, decentralization, fiscal discipline

*Comments and suggestions from participants at the 2014 IIPF (Lugano), 8th Norwegian-German Seminar on Public Economics (München), a workshop in Copenhagen, and David Roodman are gratefully acknowledged. Some of the data is obtained from the Norwegian Social Science Data Services (NSD). All errors and mistakes are our own.

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1 Introduction

The varying successfulness of balanced budget regulations (BBRs) calls for more empirical research on the design of such. This paper studies how fiscal adjustment in Norwegian local governments changed following a reform of the regulatory framework. In Norway, local governments are subject to an ex ante BBR, allowing them to carry deficits to the next year. In order to avoid fiscal imbalances, however, the central government to some extent controls local budgets and places restrictions on local government borrowing.

In 2001 the system for central government control with the local governments went through a major reform. Until 2001, all local governments had to have budgets and resolutions to raise new loans approved by the county governor, the central government's representative in the county.[1] In 2001 the central government introduced the Register for State Review and Approval of Financial Obligations (Robek). Robek lists local governments that violate the BBR, most often by accumulating deficits over a period of three years or more. The introduction of Robek gives that the local governments capable of managing their finances in a satisfying way become subjects to less control, while those that are not remain under tight central government monitoring. Local governments in the register must tighten their budgetary policy in order to be removed from the register.

Our approach is to study whether the deficit dynamics, i.e., the local government response to deficits, changed after the introduction of Robek. Importantly, the formal monitoring of budgets and borrowing for local governments were similar for local governments in Robek were similar before and after 2001. The difference is that local governments outside the register are not monitored since 2001. Stronger adjustment in the post-reform period may thus indicate some interesting mechanisms. First, the additional control can be more effective since the central government can focus its attention on a relatively small fraction of the local governments rather than all. Consequently, the formal mechanism may be more forceful. In addition, an informal "list of shame effect" can be in play, since entering Robek can be a signal of poor political leadership in the local government.

The results indicate that even though adjustment of deficits took place also in the pre-reform period, the local governments with deficits clearly adjust their fiscal policy to a larger extent in the post-reform period. Moreover, the effect is not driven by local governments that are listed in Robek. Hence, at least some of the effect can be owing to informal disciplinary mechanisms. These findings have interesting policy implications, since they show that it is not necessarily the formal restrictions exclusively that determine the successfulness of the rule.

[1] Note that the county governor is an employed bureaucrat, not an elected politician.

Our interpretation is that an additional disciplinary mechanism arises from the increased voter awareness of deficits in the new system. This interpretation is further strengthened by results indicating that local governments with surpluses do not seem to change their behavior much following the reform. Hence, increasing the transparency of local government finances may in fact be an effective way of promoting fiscal discipline. The relatively low administrative costs of increasing transparency in such a way is also an advantage by this approach.

Note, however, that we do not argue that this informal channel should replace formal monitoring and disciplinary mechanisms. A more useful policy advice is to consider informal mechanisms as useful supplements to formal constraints. In this respect, it is worth noting that our results also suggest that monitoring is more succesful

The paper proceeds as follows: In Section 2 we give a brief review of the relevant literature. Section 3 presents the institutional framework. In Section 4 we present our data and empirical strategies. The main results are discussed in Section 5 before an alternative estimation procedure is discussed in Section 6. Finally, Section 7 offers some concluding remarks.

2 Related literature

To which extent central government restrictions can stimulate fiscal discipline in local and regional governments has been debated in the economics literature for decades.[2] Studies of US states in general conclude that restrictions may be a helpful tool in order to secure fiscal discipline, but that the efficiency of the restrictions vary with their design and institutional surroundings. Some key contributions are Holtz-Eakin (1988), Alt and Lowry (1994), Poterba (1994) and Bohn and Inman (1996). Bohn and Inman draw an interesting conclusion in that the most important feature of a BBR is whether it is imposed ex ante or ex post, i.e., whether deficits are allowed to be carried to the next year or not. They conclude that ex ante rules (such as the Norwegian) seem to be ineffective.

Two recent studies have looked into the effects from the Robek register. Hopland (2013) investigates how local governments respond to inclusion in Robek in the period 2001-2010. His findings suggest that local governments that enter Robek reduce their deficits, mainly through reductions in expenditures. He goes on to conclude that the treatment effect is likely due to a combination of both formal and informal disciplinary mechanisms, as well as the

[2]There is also an ongoing debate as to how fiscal rules affect central government expenditures. See, e.g., the recent study by Dahan and Strawczynski (2013). While studying 22 OECD countries, they find that fiscal rules are useful for reducing budget deficits in advanced countries. They also find that the ratio of social transfers to government consumption (and to government wages) tends to decline more rapidly in countries implementing fiscal rules.

introduction of ex post features to the ex ante BBR. The formal mechanism is that local governments in Robek are subject to closer central government monitoring and are forced to be more realistic in their budgeting. In addition, an informal mechanism may arise through that inclusion in Robek gives negative attention in the local media and public debate. Thus it can be considered as a "list of shame" for local politicians. Hopland discusses the mechanisms briefly, but his approach does not allow him to distinguish between them.

Hopland (2014) offers a first insight into the potential of informal mechanisms from the register by studying the voter response to inclusion in Robek. He finds that inclusion in Robek gives a reduction in vote-share for the incumbent party in the area of 3 percentage points, while the re-election probability is reduced by as much as 12%. The interpretation is that Robek acts as a strong and reliable signal of the abilities of the political leadership in the local government. His findings are closely related to the findings in Brender (2003), where it was shown that the extent to which Israeli voters punished fiscally irresponsible mayors is dependent on the transparency of public accounts.

The strong voter-reponse found in Hopland (2014) suggests that the informal channel suggested in Hopland (2013) is active. It is, however, difficult to translate the findings in Hopland (2014) (and Brender, 2003) into actual fiscal adjustment. Even though voters are in fact responsive to deficits, it is not certain that the politicians respond to this mechanism. This can be the case if, for example, politicians are not aware of the strong voter response to poor fiscal performance. However, the results in the present paper suggest that the benefits from informal disciplinary mechanisms can be substantial. This should be of clear policy relevance, since it can give policy makers guidance with regards to the design of BBRs. [Finnast det noko litteratur som kan knyttast opp til "kvalitet" på monitoring ved targeted vs generell monitoring?]

In a broader context, this paper is related to the large literature on the common-pool problem related to fiscal decentralization.[3] Such problems arise when local politicians focus exclusively on pleasing local voters and expect to be bailed out in the case of a fiscal emergency. A typical prediction is that local tax collection will be too low and local spending too high. Following the seminal work of Kornai (1979) this is referred to as the soft budget constraint problem. Pettersson-Lidbom (2010) studies soft budgets in Swedish local governments based on a dynamic commitment problem. His findings suggest that the predicted effect by going from a hard to a soft budget constraint is an increase in debt by more than 20%. Such costs provide a likely explanation as to why many countries in recent years have

[3]The economic arguments in favor of decentralization are well-known. Tiebout (1956) argues that local governments will have strong incentives to provide efficient public goods, in order to attract tax paying residents. Moreover, decentralization offers the possibility to match local policies to local preferences (Oates, 1972).

imposed stricter surveillance of the fiscal policy in their respective local and regional governments. The book edited by Rodden et al. (2003) contains several examples of increasing central government monitoring of local governments' fiscal dispositions in a wide array of federations. Examples are found in the full range from highly developed countries like the US (Inman, 2003) and Canada (Bird and Tazzonyi, 2003), via economies in transition like Hungary (Wetzel and Papp, 2003) to less developed countries as Argentina (Webb, 2003) and India (McCarten, 2003).

3 The Robek register and institutional background

As in other Scandinavian countries, Norwegian local governments are important providers of welfare services like child care, primary and lower secondary education, primary health care and care for the elderly. The main revenue sources for the local governments are taxes, grants from the central government and user charges. Whereas the local governments have a large degree of discretion on the expenditure side, the revenues are heavily regulated under central standards. The opportunity to influence current revenues is in practice limited to property tax and user charges.

The political system at the local government level is a representative democracy where the members of the local council are elected every fourth year. The national parties are important players, and the national struggle between the socialist and non-socialist camps is mirrored at the local level. Compared to national politics, a main difference is that the majority coalition does not form a cabinet. The typical organization is an alderman model with an executive board with proportional representation from all major parties. The executive board is led by the mayor, and the members of the executive board, including the mayor and the deputy mayor, are elected among the members of the local council. Prior to each fiscal year, the local council makes decisions regarding current spending, revenue, investment activity and borrowing. The executive board and the chief administrative officer (*rådmannen*) are central players in the early stages of the budgetary process, and the executive board presents a budget proposal for the local council. The groupings in the local council are free to put forward own suggestions, either small or large changes to the proposal from the executive board, or totally different budget proposals. Finally, the local council determines the budget either by voting over alternative budget proposals or issue by issue.

The main requirement in the Norwegian BBR is operational budget balance. In the budget (or ex ante), current revenues must be sufficient to cover current expenditures (wages and materials) and debt servicing costs (net interest payment and net installment on debt). Since the introduction in 2001, Robek has listed local governments that have violated the

BBR by passing a budget with a net operating deficit, or have been unable to cover an actual deficit within two years.[4] Local governments may enter and exit the register throughout the year. Entries (exits) in the period January-May are most often due to failure (success) in adopting a balanced budget. Entries (exits) in the period June-December are most often due to failure (success) in covering old deficits, based on the accounts from the previous year. The far most common reason for inclusion in Robek is that it has taken too long to cover a deficit.

It should be noted that the introduction of the register was a liberalization, where the local governments that are able to manage their finances in a satisfying way become subjects to less control. The idea to abolish central government control of borrowing was first introduced by the commission that prepared the new Local Government Act of 1993. The introduction of the Robek register several years later can be seen as a compromise, where the monitoring is primarily focused on local governments with fiscal imbalances. The idea was that it is better to focus the county governor's effort on the local governments in need of special attention, rather than spreading the effort on all local governments (see Borge and Rattsø (2002) for a more detailed discussion of the development of the regulatory framework). The formal consequences did not change much for local governments running deficits. The potential for additional effects arises from two channels. First, the formal monitoring can be more effective, since the central government focuses its attention on fewer local governments. Second, an informal disciplinary mechansim may be active, owing to the possibility that voters perceive Robek as a credible signal of the local politicians' abilities. Interestingly, the 'list of shame effect' was never mentioned as a target when establishing the register (officially at least). Hence, the informal disciplinary effect may have unintentionally turned out to be a valuable supplement to the formal discipline.

4 Data and empirical strategy

Our dataset covers the period 1991-2010, i.e., ten years prior to the introduction of Robek and 10 years after.[5] As our dependent variable, we use the net operating surplus measured in NOK 1,000 per capita (fixed 2011 prices). The development of our dependent variable, aggregated to the national average, is shown graphically in Figure 1. We observe that there is a period with somewhat higher volatility around the mid-2000s. After a period with growth in the surpluses between 2002 and 2006, a substantial fall occurred in the period 2006-2008,

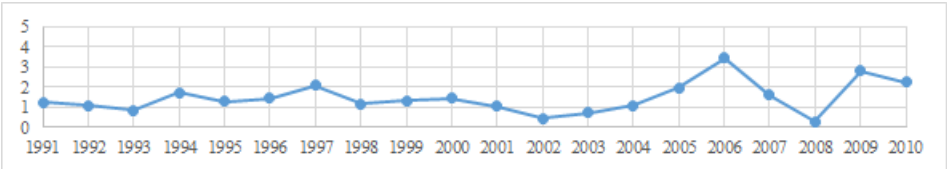
[4] An actual deficit is covered when future surpluses are at least as large as the deficit.

[5] Some of the data for the period 1991-2000 has been collected from the Norwegian Social Science Data Services (NSD), structured, and documented by Fiva et. al (2012).

before increasing again.

The low net operating surplus in the early 2000s reflects low revenue growth. The revenue growth gradually picked up in the period 2003-2006 and contributed to an increase in the net operating surplus. The development in 2008 and 2009 reflects the financial crisis. Many Norwegian local governments have substantial financial wealth that is invested in national and global financial markets. They experienced severe financial losses in 2008 when the financial markets dropped and large gains in 2009 when the markets picked up again. In 2009 the local governments also benefited from the fiscal stimulus package to counteract the effects of the financial crisis.

Figure 1: Average net operating result per cap (in 1,000 NOK fixed 2011 prices)



The aim is to study how the net operating surplus in year t depends on earlier year's surpluses, and in particular if this effect changed after the introduction of Robek in 2001. As a descriptive exercise, we in Table 1 start out by looking at the average net operating surplus over the whole period, and in the sub-periods before and after the introduction of Robek. We observe that the net operating surplus is significantly higher in the post-reform period. The difference is not only statistically significant, at NOK430 per capita (fixed 2011 prices) it is also of real economic importance.[6]

Table 1: Descriptive statistics, net operating surplus.

Period	Full sample (1991-2010)	Pre-reform (1991-2000)	Post-reform (2001-2010)	Difference
Average	1.22	1.01	1.44	-0.43***
(St.dev)	(3.46)	(2.41)	(4.27)	
No. of obs.	8,574	4,321	4,253	

Measured as 1,000 per capita in fixed 2011 prices.
Based on the 430 local governments in 2010.
*** p<0.01

The fact that surpluses are higher in the post-reform period is consistent with the hypothesis of stronger fiscal adjustment in this period. Despite this, it would be premature to make any conclusions at this point, since there can be a variety of reasons for this difference. In order to study the differences in adjustment properly, we must conduct a thorough econometric

[6] 6 NOK amounts to roughly 1 USD.

analysis. We use the following dynamic panel equation as our point of departure:

$$y_{it} = \sum_{s=1}^{k} \beta_s y_{it-s} + \sum_{s=1}^{k} \gamma_s \left(Ry_i\right)_{t-s} + \mathbf{x}_{\boldsymbol{it}}^{'}\boldsymbol{\theta} + \alpha_i + \delta_t + \epsilon_{it} \tag{1}$$

y_{it} is the surplus in local government i in year t and R_t is a dummy equal to 1 in the post-reform period (i.e., 2001-2010). In this full dynamic specification, we expect a negative sign on the βs, indicating adjustment. The coefficients of most interest, however, are the γs. If the introduction of the Robek register led to a stronger adjustment policy, the sign of these should also be negative. We model the dynamics using three lags (i.e., $k = 3$). $\mathbf{x}_{\boldsymbol{it}}$ is a vector of control variables.[7] δ_t includes all observable and unobservable characteristics that vary over time, but not across local governments. In the regressions, we control for this by including time dummies.

α_i is a local government fixed effect that is likely to bias OLS estimates. Moreover, it is well-known that controlling for local government fixed effects (LFE) using the within-group transformation in dynamic panel models will not lead to an unbiased estimator either (Nickel, 1981). Even though the within-group/LFE estimataors are consistent, since the bias fades away as the number of periods increase, we rather use the GMM procedure suggested by Holtz-Eakin et al. (1988) and Arrelano and Bond (1991) (henceforth Arrelano-Bond estimation).[8]

In short, the Arrelano-Bond procedure removes the local government fixed effect by a first difference transformation. Further, lagged values of the endogenous variables are used as instruments for subsequent first-differences. If ϵ_{it} is serially uncorrelated, surpluses from $t-2$ and backwards are valid as instruments. Some preliminary analyses indicated, however, that neither the second, third, nor fourth lag perform well as instruments, since they frequently fail to pass overidentification tests. As a consequence, $t-5$ is the first lag used as an instrument. Moreover, we treat not only the first lag, but all three lags of y_{it} and $\left(Ry_i\right)_t$ included in the regression equation as endogenous.

The vector of control variables includes a set of fiscal indicators, political variables and demographic characteristics of the local government. The fiscal variables are the local government revenues and lagged net debt payment (installment and interest rates). The revenue measure includes the block grants from the central government and local taxes. Both the revenues and debt payments are measured per capita.

[7] Descriptive statistics for the control variables are reported in the Appendix.

[8] To test which method was most suitable, we estimated a simple AR(1) version of Equation (1). Even though the LFE estimates did not differ dramatically from the Arrelano-Bond estimates, the results still suggested that there is some bias in the LFE estimates. The Arrelano-Bond procedure has been implemented using the Stata package xtabond2, thoroughly described by Roodman (2009b).

Several studies of Norwegian local governments have emphasized the impact of political strength. Of particular interest for the present paper is the study by Borge (2005), who found that political strength reduces deficits. In addition political strength is shown to reduce administrative spending (Kalseth and Rattsø, 1998), to increase efficiency (Borge et al., 2008 among others) and improve maintenance of local public buildings (Borge and Hopland, 2012). We use the effective number of parties ($ENOP$), which is the inverse of the traditional Herfindahl-Hirschman index

$$ENOP = \left(\sum_{p=1}^{P} SH_p^2 \right)^{-1} \tag{2}$$

where SH_p is the share of representatives from party p. In Norway, the socialist camp is dominated by the Labor party, while the non-socialist camp is more fragmented. As a consequence, there is a negative correlation between party fragmentation and the share of socialists in the local council.[9] Since we cannot rule out that socialist influence has an impact on economic outcomes, we control for the share of socialists to avoid that the coefficient for political fragmentation captures ideological preferences. This is useful, even though the political fragmentation also just serves as a control. Socialist parties are defined as the social democrats (The Labor Party) and parties to its left.

The demographic characteristics included are the population size and variables capturing age composition. We include the share of the population below school age (0-5 years), the share of the population in primary and lower secondary schools (6-15 years) and the share of elderly citizens (80 years and above). Kindergartens, primary and lower secondary schools and care for the elderly are the major tasks for a local government, and these demographic variables may capture the relative strength of different interest groups.

5 Main results

We present our main results in Table 2. All results are from two-step difference GMM estimations with Windmeijer-corrected standard errors (Windmeijer, 2005). In Column (A) we include all local governments, while we in Columns (B)-(D) split the sample based on the fiscal performance in earlier years. As in the descriptive statistics, all monetary values are in fixed 2011 prices.

The coefficients for the lagged operating surpluses (y_{it}) all come out as negative or zero, indicating that at least some adjustment is taking place independently of Robek. When

[9] The correlation between the effective number of parties and the share of socialists (both across local governments and over time) is -0.41.

Table 2: Arrelano-Bond estimations of net operating surplus per capita

	(A) All	(B) Accumulated deficit over the 3 last years	(C) Accumulated deficit over the 2 last years	(D) Deficit last year
Net operating surplus	-0.293**	-0.564	-0.0890	-0.535***
per capita (in 1,000s) ($t-1$)	(0.126)	(0.364)	(0.300)	(0.137)
Net operating surplus	-0.256***	-0.134	-0.226	-0.0733
per capita (in 1,000s) ($t-2$)	(0.0965)	(0.266)	(0.156)	(0.234)
Net operating surplus	-0.207	-0.499**	-0.0909	-0.125
per capita (in 1,000s) ($t-3$)	(0.126)	(0.208)	(0.191)	(0.125)
Interaction between net operating surplus	0.450	-0.205	-0.840**	-0.526*
per capita and Robek-period dummy ($t-1$)	(0.306)	(0.407)	(0.346)	(0.269)
Interaction between net operating surplus	0.0163	-1.182***	-1.070***	-0.932***
per capita and Robek-period dummy ($t-2$)	(0.0982)	(0.251)	(0.275)	(0.294)
Interaction between net operating surplus	-0.233***	-0.625**	-1.009***	-0.592**
per capita and Robek-period dummy ($t-3$)	(0.0665)	(0.264)	(0.238)	(0.250)
Free disposable income per capita	0.512***	0.382***	0.366***	0.300***
(in 1,000s)	(0.0610)	(0.0855)	(0.0797)	(0.0701)
Net debt payment per capita (in 1,000)	0.600***	0.248	0.0685	-0.0142
($t-1$)	(0.202)	(0.212)	(0.112)	(0.208)
Effective number of parties	0.148*	0.196	0.220	0.213
	(0.0894)	(0.191)	(0.157)	(0.147)
Share of socialists in the local council	1.268	0.0192	0.0812	-1.164
	(0.852)	(2.349)	(1.691)	(1.454)
Population	0.000293**	0.000572*	0.000266	1.44e-05
	(0.000129)	(0.000342)	(0.000226)	(0.000224)
Percentage of population 0-5 years	0.0533	0.217	0.213	-0.151
	(0.120)	(0.276)	(0.271)	(0.228)
Percentage of population 6-15 years	0.0716	-0.226	-0.296	-0.253
	(0.0986)	(0.290)	(0.237)	(0.219)
Percentage of population 80 years or	-0.146	0.0320	0.276	0.163
more	(0.157)	(0.438)	(0.273)	(0.248)
Observations	6,294	1,036	1,278	1,515
No. of local governments	428	295	352	386
Lags used as instruments	From $t-5$	From $t-5$	From $t-5$	From $t-5$
Hansen p-value	0.08	0.47	0.15	0.07
No. of instruments	144	144	144	144

Windmeijer corrected standard errors in parentheses. Time dummies (not reported) included.
All monetary values are in fixed 2011 prices.
*** p<0.01, ** p<0.05, * p<0.1

including all local governments [Column (A)], we have that the two first lags are significantly negative, while the third lag just falls short of significance (t-value = -1.64). Overall, a deficit of NOK 1,000 per capita in the last year will be met by an increase in the operating surplus of about 300 NOK per capita in year t. The effect for the second lag is a bit lower, about 260 per capita for each 1,000 in deficit per capita. On face value, the (almost significant) coefficient for the third lag indicates that a deficit of 1,000 per capita will be countered by an improvement of the surplus of about 210 NOK per capita.

When including only the local governments that had an accumulated deficit over the three last years in Column (B), the coefficients increase quite a bit for the first and third lag.[10] On

[10]Note that even though these local governments have an accumulated deficit over the last three years they need not be in Robek or even in immediate danger of entering Robek in the post-reform period. The reason is two-fold. First, we do not take the particular timing of Robek into account when splitting the sample, i.e., we do not require that the deficit started to accumulate at $t-3$. Second, we do not take into account

face value, the adjustment for these two lags following from a deficit of 1,000 NOK is about 560 and 500 for the first and third lag, respectively.

The coefficient for the second lag, on the other hand, is almost cut half. Further, the precision of the estimates is also lower. With a t-value of -1.55 the first lag is not significant at any conventional level of significance, and the t-value for the second lag is only about -0.5. Hence, only the third lag comes out as significant in this reduced sample. It should be noted that the sample becomes much smaller, dropping from close to 6,300 observations to 1,036 and that only about 2/3 of the local governments experienced such a period. This may be a reason for the relatively low precision of the estimates.

Since the BBR specifies that a deficit in year $t-2$ must be covered by year t, it is of particular interest to study the differences between the two periods over such time intervals. Taken at face value, the coefficients in Column (B) reveal an interesting picture. Suppose a local government runs a deficit of 1,000 in year 0. Before Robek the local government would decrease the deficit to $1000 - 1,000 \times 0.564 = 436$, while it in year 2 would decrease it to $436 - 436 \times 0.564 - 1,000 \times 0.134 = 56$. The total adjustment after two years is thus roughly sufficient to regain balance, but not to cover the initial deficit. In the post-reform period, the adjustment in the first year is $1,000 - 1,000 \times (0.564 + 0.205) = 231$, while it in year 2 is $231 - 231 \times (0.564 + 0.205) - 1,000\,(0.134 + 1.182) = -1,262$. Hence, the initial deficit of 1,000 is more than covered after two years.

In Column (C) we include the local governments that had an accumulated deficit over the two last years. The number of observation then increases to close to 1,300 and an additional 57 local governments fall into this category. Interestingly, none of the lags of y_{it} come out as significant, indicating that little adjustment took place in the period as a whole.

Finally, Column (D) includes all local governments that experienced deficits in any year $t-1$. This gives us an extra 237 observations compared to Column (C), and an additional 34 local governments are included, meaning that 90% of the local governments at some time experienced a deficit in a year $t-1$. We observe that only the coefficient for the first lag of y_{it} comes out as significant, while the coefficients for the second and third lags are close to zero, and far from being significant at any conventional level of significance. The results show that a deficit of 1,000 NOK per capita in the previous year give an improvement of the surplus in year t of about 540 NOK per capita.

We next turn to the effect from lagged values of the interaction term between the net operating surplus and the Robek-period dummy, $(Ry_i)_t$. When including all local governments in Column (A), we observe that the two first lags come out as insignificant, while

whether the local governments had disposable funds available to cover the deficits. We have tried to split the sample following the rule closely, but this gives us a very low number of observations.

the coefficient for the third lag is clearly significantly negative. Hence, even when including many local governments with little need for adjustment, we observe both adjustment and an additional effect from being in the post-reform period. The coefficient indicate that the additional adjustment taking place after the introduction of Robek translates into about NOK 230 per capita for each NOK 1,000 per capita in deficit.

The picture is clearer when looking at the local governments with deficits in earlier years. When studying local governments with an accumulated deficit over the three last years [Column (B)], we have that the first lag comes out as insignificantly negative, while the two longest lags are both significantly negative. Moreover, the added effect in the post-reform period is strong. The coefficient for the second lag is about 1, indicating that deficits two years ago are covered at a one-to-one basis in the post-reform period, whereas there was no significant adjustment in the pre-reform period. For the third lag, the coefficient is about -0.63. Hence, even though there was also significant adjustment for this lag in the pre-reform period, the effect is more than doubled after the introduction of Robek.

The difference between the two periods is even more evident when looking at Columns (C) and (D). In Column (C), we witness no significant adjustment in the pre-reform period, but roughly a one-to-one adjustment for all three lags in the post-Robek period. In Column (D), we observe that the adjustment is doubled for the first lag, while there is only significant effect in the post-reform period. Moreover, the effect for the two last lags is very strong in the period after the introduction of Robek, about one-to-one for the second lag, and about 600 NOK pr 1,000 NOK in deficit for the third lag.

The conclusion is thus that the introduction of Robek has a preventive effect, in the sense that it stimulates local governments with fiscal imbalances to take additional actions. Importantly, the additional adjustment taking place in the post-reform period is not only significant in statistical terms, but also of real economic importance.

Most of the control variables are of less importance. This is likely due to the fact that there is only a limited variation left to explain after differencing out the fixed effects and including a rich dynamic specification. Not surprisingly however, higher revenues give higher surpluses. There are also some indications that populous local governments have higher surpluses.

Since a large number of instruments may weaken the tests for instrument validity (i.e., give too high Hansen p-values), it is recommended to routinely report robustness analyses where fewer lags are used as instruments (Roodman, 2009a). Even though the Hansen p-values in our main results are not implausible large, we address this in Table 3 where we use only the period $t-5$ to $t-8$ as instruments. The first observation is that the number of instruments is reduced to about half of that in Table 2. The second observation is that the

Table 3: Arrelano-Bond estimations of net operating surplus per capita. Robustness check using fewer instruments.

	(A) All	(B) Accumulated deficit over the 3 last years	(C) Accumulated deficit over the 2 last years	(D) Deficit last year
Net operating surplus	-0.241	-0.719	-0.201	-0.582***
per capita (in 1,000s) $(t-1)$	(0.172)	(0.576)	(0.255)	(0.0966)
Net operating surplus	-0.222*	-0.367	-0.326***	-0.293
per capita (in 1,000s) $(t-2)$	(0.125)	(0.343)	(0.118)	(0.226)
Net operating surplus	-0.173	-0.493**	-0.139	-0.227
per capita (in 1,000s) $(t-3)$	(0.135)	(0.239)	(0.164)	(0.175)
Interaction between net operating surplus	0.474	-0.0955	-0.623*	-0.726***
per capita and Robek-period dummy $(t-1)$	(0.288)	(0.629)	(0.370)	(0.223)
Interaction between net operating surplus	-0.0468	-0.945***	-0.844***	-1.217***
per capita and Robek-period dummy $(t-2)$	(0.116)	(0.358)	(0.246)	(0.243)
Interaction between net operating surplus	-0.288***	-0.631**	-1.032***	-0.475
per capita and Robek-period dummy $(t-3)$	(0.106)	(0.312)	(0.281)	(0.365)
Free disposable income per capita	0.564***	0.370***	0.488***	0.205**
(in 1,000s)	(0.0662)	(0.135)	(0.0881)	(0.0910)
Net debt payment per capita (in 1,000)	0.718***	0.214	0.151	-0.126
$(t-1)$	(0.122)	(0.345)	(0.209)	(0.168)
Effective number of parties	0.137*	0.245	0.290*	0.243*
	(0.0785)	(0.208)	(0.155)	(0.133)
Share of socialists in the local council	0.843	-3.465	-0.649	-1.242
	(0.829)	(2.399)	(1.665)	(1.347)
Population	0.000386***	0.000374	0.000412*	0.000126
	(0.000126)	(0.000365)	(0.000218)	(0.000272)
Percentage of population 0-5 years	-0.0182	0.103	0.222	-0.160
	(0.124)	(0.259)	(0.252)	(0.227)
Percentage of population 6-15 years	-0.0121	-0.325	-0.225	-0.329
	(0.0997)	(0.292)	(0.283)	(0.295)
Percentage of population 80 years or	-0.165	0.372	0.0843	-0.154
more	(0.162)	(0.492)	(0.318)	(0.268)
Observations	6,294	1,036	1,278	1,515
No. of local governments	428	295	352	386
Lags used as instruments	$t-5$ to $t-8$	$t-5$ to $t-8$	$t-5$ to $t-8$	$t-5$ to $t-8$
Hansen p-value	0.29	0.54	0.24	0.92
No. of instruments	78	78	78	78

Windmeijer corrected standard errors in parentheses. Time dummies (not reported) included.
All monetary values are in fixed 2011 prices.
*** p<0.01, ** p<0.05, * p<0.1

Hansen p-values go up rather than down. The third, and final, observation is that the main results are not affected much by the change in lag structure of the instruments.

The results support stronger fiscal adjustment after the introduction of Robek and are thus consistent with our hypotheses that more targeted monitoring and an informal list of shame effect make the system more effective. The remainder of this section is devoted to test the validity of this interpretation.

First, we look at local governments with strong fiscal performance, i.e., we split the sample similar as in Table 2, but include only those with accumulated surpluses the last three, two and one years. Since these need not adjust in order to avoid Robek, we do not expect the reform to affect their behavior much. Some additional adjustment can be expected, since they are more free to increase expenditures after years with surpluses in the new system

Table 4: Arrelano-Bond estimations of net operating surplus per capita. Including only local governments with surpluses.

	(A) Accumulated surplus over the 3 last years	(B) Accumulated surplus over the 2 last years	(C) Surplus last year
Net operating surplus	-0.284*	-0.274**	-0.257**
per capita (in 1,000s) $(t-1)$	(0.147)	(0.139)	(0.119)
Net operating surplus	-0.278***	-0.281***	-0.308**
per capita (in 1,000s) $(t-2)$	(0.0997)	(0.106)	(0.131)
Net operating surplus	-0.259**	-0.235**	-0.277**
per capita (in 1,000s) $(t-3)$	(0.120)	(0.110)	(0.135)
Interaction between net operating surplus	0.470	0.440	0.418
per capita and Robek-period dummy $(t-1)$	(0.300)	(0.291)	(0.286)
Interaction between net operating surplus	0.0979	-0.00116	-0.0663
per capita and Robek-period dummy $(t-2)$	(0.121)	(0.131)	(0.128)
Interaction between net operating surplus	-0.229**	-0.189*	-0.107
per capita and Robek-period dummy $(t-3)$	(0.0948)	(0.106)	(0.0821)
Free disposable income per capita	0.474***	0.489***	0.515***
(in 1,000s)	(0.0807)	(0.0825)	(0.0938)
Net debt payment per capita (in 1,000)	0.572**	0.447*	0.434**
$(t-1)$	(0.224)	(0.233)	(0.173)
Effective number of parties	0.213*	0.142	0.123
	(0.113)	(0.0989)	(0.107)
Share of socialists in the local council	1.328	1.478	1.290
	(0.974)	(0.981)	(1.036)
Population	0.000387**	0.000351*	0.000575**
	(0.000186)	(0.000212)	(0.000292)
Percentage of population 0-5 years	-0.0107	-0.0553	0.0118
	(0.122)	(0.130)	(0.127)
Percentage of population 6-15 years	0.131	0.149	0.0656
	(0.114)	(0.106)	(0.108)
Percentage of population 80 years or	-0.128	-0.0818	-0.134
more	(0.204)	(0.196)	(0.181)
Observations	5,262	5,018	4,776
No. of local governments	428	428	428
Lags used as instruments	From $t-5$	From $t-5$	From $t-5$
Hansen p-value	0.08	0.05	0.11
No. of instruments	144	144	144

Windmeijer corrected standard errors in parentheses. Time dummies (not reported) included.
All monetary values are in fixed 2011 prices.
*** p<0.01, ** p<0.05, * p<0.1

than in the old, giving adjustment toward zero from above. On the other hand, the new system, giving more autonomy to local governments with healthy finances, can give that local governments with surpluses are stimulated to further increase surpluses and thus secure their autonomy. This will, ceteris paribus draw in the direction of a positive sign of the interaction terms. The total effect is thus a priori unclear, but we should at least expect much weaker additional adjustment in the post-reform period than for the local governments with deficits. The results are reported in Table 4.

The results from Table 4 are supportive of our interpretation of the results. We do observe that local governments with surpluses adjust downwards in the following year(s). However, the important take-away is that we do not see much additional adjustment in the post-reform period. The conclusion is thus that whereas the reform seems to have a disciplinary effect

on local governments with poor fiscal performance, local governments with surpluses behave similarly in both periods.

Table 5: Arrelano-Bond estimations of net operating surplus per capita. Excluding local governments in Robek.

	(A) All	(B) Accumulated deficit over the 3 last years	(C) Accumulated deficit over the 2 last years	(D) Deficit last year
Net operating surplus	-0.372***	-0.410	-0.0966	-0.525***
per capita (in 1,000s) ($t-1$)	(0.140)	(0.322)	(0.283)	(0.117)
Net operating surplus	-0.303**	0.0353	-0.322*	-0.0331
per capita (in 1,000s) ($t-2$)	(0.124)	(0.311)	(0.191)	(0.340)
Net operating surplus	-0.255**	-0.279	-0.124	-0.0958
per capita (in 1,000s) ($t-3$)	(0.126)	(0.258)	(0.185)	(0.138)
Interaction between net operating surplus	0.556**	-0.515	-0.940***	-0.473
per capita and Robek-period dummy ($t-1$)	(0.267)	(0.361)	(0.324)	(0.293)
Interaction between net operating surplus	0.0794	-1.078***	-0.945***	-0.753*
per capita and Robek-period dummy ($t-2$)	(0.0853)	(0.320)	(0.247)	(0.429)
Interaction between net operating surplus	-0.198***	-0.358	-0.754***	-0.553**
per capita and Robek-period dummy ($t-3$)	(0.0562)	(0.336)	(0.282)	(0.252)
Free disposable income per capita	0.500***	0.336***	0.321***	0.306***
(in 1,000s)	(0.0610)	(0.0788)	(0.0786)	(0.0790)
Net debt payment per capita (in 1,000)	0.833***	0.157	0.0554	0.0790
($t-1$)	(0.196)	(0.160)	(0.118)	(0.225)
Effective number of parties	0.192**	0.120	0.0915	0.258*
	(0.0917)	(0.192)	(0.163)	(0.152)
Share of socialists in the local council	0.664	0.110	-0.124	-1.357
	(0.889)	(2.443)	(1.496)	(1.335)
Population	0.000306***	0.000635	0.000366	8.79e-05
	(0.000115)	(0.000388)	(0.000241)	(0.000223)
Percentage of population 0-5 years	0.0202	0.460	0.384	-0.218
	(0.115)	(0.303)	(0.266)	(0.233)
Percentage of population 6-15 years	0.0938	0.319	0.00377	-0.375*
	(0.110)	(0.287)	(0.264)	(0.204)
Percentage of population 80 years or	-0.224	0.264	0.269	0.0361
more	(0.157)	(0.369)	(0.282)	(0.310)
Observations	5,648	743	1,025	1,314
No. of local governments	428	282	347	385
Lags used as instruments	From $t-5$	From $t-5$	From $t-5$	From $t-5$
Hansen p-value	0.20	0.12	0.34	0.11
No. of instruments	144	144	144	144

Windmeijer corrected standard errors in parentheses. Time dummies (not reported) included.
All monetary values are in fixed 2011 prices.
*** p<0.01, ** p<0.05, * p<0.1

Second, we investigate whether the additional adjustment in the post-reform period are driven by local governments that are actually in the register. If this is the case, it is reasonable to assume that the lions share of the effect is owing to improved quality of the monitoring as there are fewer local governments to monitor. If the results are similar as in the benchmark regressions, on the other hand, this indicates that informal mechanisms are active and important.

The results are reported in Table 5. The overall picture remains, in the sense that local governments adjust deficits faster in after Robek was introduced. However, a slightly puzzling positive coefficient is observed for the first lag of the interaction term when including the full

set of local governments [Column (A)]. In addition, there is a tendency that the adjustment coefficients are weaker throughout the regressions, in both periods. This is probably owing to the fact that by excluding local governments in Robek, these regressions include a substantial overweight of local governments with a healthy fiscal situation in the last half of the sample period.

To sum up the main results, it is clear that the introduction of Robek affected the deficit dynamics in Norwegian local governments. Interestingly, the additional adjustment is not driven by local governments that are actually in the register and thus subject to additional formal monitoring. This indicates that there are additional informal disciplinary mechanisms in play.

6 Separate estimations for the pre- and post-reform periods

An alternative approach to the one studied above is to split the dataset and treat the periods before and after the introduction of Robek separately. An advantage by this approach is that the econometric formulation becomes simpler, since we can exclude the interaction terms $(Ry_i)_t$ and estimate

$$y_{it} = \sum_{s=1}^{k} \beta_s^p y_{it-s} + \mathbf{x}_{\boldsymbol{it}}^{'} \boldsymbol{\theta^p} + \alpha_i^p + \delta_t^p + \epsilon_{it}^p \tag{3}$$

with the superscript p indicating that the coefficients may differ between the two periods. Except for the excluded interaction terms, Equation (3) includes the same variables as Equation (1). We also use the same GMM estimation technique and the same number of lags ($k = 3$). The number of instruments will, however, be much lower due to the exclusion of the endogenous interaction terms and the shorter time series. A drawback is that the number of observations is, naturally, reduced drastically when splitting the sample. The results are reported in Table 6.

In Columns (A) and (B) all local governments are included. We observe that the coefficients are very different for the two periods. While they are all insignificantly negative in the period prior to the introduction of Robek, the picture is very different in the post-reform period. In the period 2001-2010 we have that the first lag comes out as positive, indicating sluggishness, while the two longer lags are significantly negative, indicating adjustment. Thus it seems that local governments become increasingly sensitive to deficits two and three years ago. The unclear direction of the effect may be due to the inclusion of local governments with strong fiscal performance.

Table 6: Separate estimations for the two periods.

	All		Accumulated deficit over the 3 last years		Accumulated deficit over the 2 last years		Deficit last year	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Net operating surplus	-0.179	0.311**	-0.690	-0.987*	-0.657*	-0.754***	-0.577***	-1.319**
per capita (in 1,000s) ($t-1$)	(0.151)	(0.132)	(0.576)	(0.516)	(0.387)	(0.262)	(0.107)	(0.672)
Net operating surplus	-0.221	-0.328*	-0.579*	-1.209***	-0.536	-1.050***	-0.520	-0.291
per capita (in 1,000s) ($t-2$)	(0.405)	(0.176)	(0.322)	(0.199)	(0.327)	(0.294)	(0.360)	(0.328)
Net operating surplus	-0.0628	-0.628***	-0.436*	-1.073***	-0.231	-0.870**	-0.224	-0.227
per capita (in 1,000s) ($t-3$)	(0.281)	(0.174)	(0.242)	(0.179)	(0.216)	(0.339)	(0.200)	(0.593)
Free disposable income	0.542***	0.566***	0.373	0.471***	0.517**	0.435***	0.318**	0.430**
per capita (in 1,000s)	(0.0873)	(0.0622)	(0.239)	(0.133)	(0.224)	(0.121)	(0.129)	(0.178)
Net debt payment per capita	4.760***	0.842***	-0.655	-0.00286	1.917	0.166	-0.798	-0.294
(in 1,000) ($t-1$)	(1.597)	(0.186)	(6.635)	(0.597)	(3.248)	(0.242)	(2.999)	(0.761)
Effective number of parties	0.143*	0.344	0.166	1.164	0.284	0.840	0.499***	0.197
	(0.0795)	(0.239)	(0.326)	(0.953)	(0.196)	(0.681)	(0.161)	(0.377)
Share of socialists in the	0.363	2.567	0.632	8.833	2.093	3.188	2.638**	0.700
local council	(0.991)	(2.571)	(1.624)	(8.595)	(1.753)	(5.133)	(1.300)	(4.352)
Population	0.000376***	0.000472***	0.000735*	0.000321	0.000307	0.000281	0.000101	0.000190
	(0.000131)	(0.000176)	(0.000379)	(0.000392)	(0.000298)	(0.000258)	(0.000193)	(0.000453)
Percentage of population	0.112	-0.774**	0.126	0.0213	0.0896	-0.0896	-0.0866	0.151
0-5 years	(0.111)	(0.338)	(0.229)	(0.596)	(0.239)	(0.604)	(0.217)	(0.499)
Percentage of population	-0.0108	-0.306	-0.134	-0.774	-0.206	-0.211	-0.330**	0.277
6-15 years	(0.111)	(0.218)	(0.177)	(0.556)	(0.146)	(0.688)	(0.157)	(1.006)
Percentage of population	-0.100	-0.683	0.229	-0.236	0.0707	0.0766	-0.198	-0.339
80 years or more	(0.147)	(0.441)	(0.386)	(0.946)	(0.319)	(0.780)	(0.248)	(0.592)
Period	1991-2001	2001-2010	1991-2001	2001-2010	1991-2001	2001-2010	1991-2001	2001-2010
Observations	2,543	2,504	213	476	329	548	464	596
No. of local governments	426	424	114	231	186	273	263	313
Lags used as instruments	From $t-5$	From $t-5$	From $t-5$	From $t-5$	From $t-5$	From $t-5$	From $t-5$	From $t-5$
Hansen p-value	0.15	0.37	0.20	0.58	0.95	0.85	0.45	0.43
No. of instruments	29	29	29	29	29	29	29	29

Windmeijer corrected standard errors in parentheses. Time dummies (not reported) included. All monetary values are in fixed 2011 prices.
*** p<0.01, ** p<0.05, * p<0.1

In Columns (C) and (D) we include only local governments with deficits over the last three year period. For these local governments, we observe a negative sign on lagged surpluses in both periods. The absolute value of the coefficients are, however, much larger in the post-reform period. Interpreted on face value, the adjustment per NOK 1,000 per capita in deficit is about NOK 300, 630 and 640 per capita higher in the post-reform period for the first, second, and third lag, respectively. The adjustment is also much stronger in terms of significance after the introduction of Robek. Whereas the adjustment is significant in all three years in this period, we only observe significant adjustment for the two longest lags in the pre-reform period.

When we in Columns (E) and (F) study the local governments with a deficit over the two last years, we have that only the first lag indicates significant adjustment in the pre-reform period. After the introduction of Robek, on the other hand, all three lags come out as significantly negative. Moreover, the the absolute value of the coefficients are also for these local governments much larger after the introduction of Robek. The difference is smallest for the first lag, about NOK 100 per capita for each NOK 1,000 per capita in deficit. For the second and third lag the difference is much larger, respectively about 510 and 640 on face value.

The two regimes look more similar when we include local governments with a deficit in the previous year. In both periods we have that while the first lag indicates significant adjustment, the two longest lags come out as only insignificantly negative. The coefficients for

the first lag are, however, quite different between the two periods. On face value the absolute value is about twice as large after Robek was introduced as in the pre-reform period.

7 Concluding remarks

This paper studies the value of informal mechanisms in BBRs using a panel data for Norwegian local governments stretching from 1991 to 2010. In 2001 the central government introduced the Register for State Review and Approval of Financial Obligations (Robek). Robek lists local governments that violate the BBR, most often by having persistent deficits over a period of three years or more. The introduction of Robek gives that the local governments capable of managing their finances in a satisfying way become subjects to less control, while those that are not remain under tight central government monitoring. Local governments in the register must tighten their budgetary policy in order to be removed from the register.

This paper has studied how deficit dynamics changed following the introduction of the register. Our results clearly indicate that a stronger adjustment took place in the 10 years following the introduction of Robek than in the 10 years prior to the introduction. The difference between the two periods is not only statistically significant, but also of real economic importance. In many cases we find that adjustment took place only in the period after the introduction of Robek. Moreover, in the cases where we also observe significant adjustment prior to the introduction of Robek, the effect in the post-reform period is in general much stronger, frequently double that of the pre-reform period.

We interpret these results to be owing to two mechanisms. First, the formal monitoring is probably more effective when the central government focuses exclusively on local governments in need of special attention rather than all. The first policy implication is thus that central governments should grant local governments with healthy economy a great deal of freedom but be ready to intervene once their fiscal balance is weak.

Second, an additional disciplinary effect arises from the increased voter awareness of deficits in the new system. Hence, increasing the transparency of local government finances may in fact be an effective way of promoting fiscal discipline. The relatively low administrative costs of increasing transparency in such a way is also an advantage by this approach. Note, however, that we do not argue that this informal channel should replace formal monitoring and disciplinary mechanisms. A more useful policy advice is to consider informal mechanisms as useful supplements to formal constraints.

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Appendix

Appendix A: Descriptive statistics

Variable	Mean (st.dev)
Local government revenue per capita ($N = 8,656$)	24.52 (13.19)
Net debt payment (in NOK 1,000 per cap) ($N = 8,364$)	0.77 (2.21)
Effective number of parties ($N = 8,555$)	4.09 (1.07)
Share of socialists in the local council ($N = 8,589$)	0.38 (0.15)
Population ($N = 8,601$)	9,227 (17,607)
Share of children (%), 0-5 years ($N = 8,590$)	7.87 (1.52)
Share of youths (%), 6-15 years ($N = 8,592$)	13.00 (1.69)
Share of elderly (%), 80 years and more ($N = 8,592$)	4.84 (1.65)

All monetary values are in fixed 2011 prices.