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Budgeting in public hospital trusts: Surplus, optimism, and accuracy

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Abstract

Hospitals in Norway are organized as trusts, required to follow the same accounting principles as the private sector, and responsible for funding their own investments. Thus, being able to run with a surplus has been an important part of their management. We analyze hospital budgeting for the whole sector over a 9-year period, looking at the size of the budget surplus, degree of optimism bias, and degree of budget accuracy when comparing to the actual financial results. Our findings indicate that on average, health trusts budget with a relatively small surplus. We find indications for optimism bias, but also examples of pessimism bias. Large health trusts seem to have a higher degree of accuracy of the budgeted results. Trusts that fail to meet budgeted results have a lower budgeted surplus the following period. Capital intensity, an indication of need for new investments, is not associated with budget surplus, degree of optimism, or budget accuracy.

KEYWORDS
budgeting, hospital, investments, new public management, optimism

1 | INTRODUCTION

Hospitals in Norway are organized as semi-independent trusts owned by regional health trusts which, in turn, are owned by the state. This governance model has been in place since a reform in 2002 transferred ownership from 19

counties to the central government and hospitals were reorganized into trusts governed by professional boards. A major goal was to improve cost control and resource management in the hospital sector. Thus, an important element in the reform was the introduction of private sector accounting principles into the public health trusts. The intention was to reduce hospital deficits and cope with the lack of financial responsibility that had been prominent during the 1990s. Prior to the reform, funding for all investments was granted by politically elected county councils and thus fell outside regular hospital budgets (Hagen & Kaarbøe, 2006; Magnussen et al., 2007). Introducing new accounting practices meant that the health trusts thereafter had to finance their own investments. This policy change follows the rhetoric of new public management (NPM) reforms by adopting private sector ideas to public sector organizations (Christensen & Lægreid, 2019).

Accounting and budgeting have been one of the main focus areas of NPM reform waves (Malmmose, 2019). As one of the core ideas of NPM is accountability, Hood (1995) argued that cost accounting is a key element to secure accountability. Budgets are thus used to strengthen accountability since they provide a plan that can be used for later performance evaluations (Covaleski & Dirsmith, 1983). Although precise definitions of "budget" vary, in this article we view a budget as "a plan expressed in monetary terms" (Anthony & Young, 2003, p. 486). Budgeting thus consists of making this plan, which is often a difficult exercise: It involves forecasting among other things, demand, prices, costs, and wages. All these factors need to be correctly forecast for the budget to be "true" (Wallander, 1999).

Budgeting in hospitals is arguably more difficult than in other parts of the public sector. Hospitals produce an intangible product that is produced and consumed simultaneously, and there is considerable demand uncertainty. Some authors have argued that the hospital budget serves more as a "ritual" than a strategic planning document (Pettersen, 1995). Whether considered as a strategic planning document or an organizational ritual, budgets play an important role in the governance of the hospital sector. Thus, the boards of Norwegian health trusts have put much emphasis on securing budget balance. During periods of deficit, board members have expressed that keeping budget balance is their most important task (Pettersen et al., 2012).

The aim of this article is to analyze the relationship between budgeted and actual results in the hospital sector in Norway over the 9-year period from 2011 to 2019. The focus is on three variables: the *size* of the budgeted result, the *deviation* between the actual and budgeted results, and the *accuracy* of budgets in Norwegian health trusts. In particular, we are interested in whether inaccuracies are systematic or unsystematic and, in the latter case, whether they are associated with factors describing structural or organizational issues. First, we look at the extent to which hospitals plan for budget surpluses as well as how the degree of surplus budgeting varies between hospitals and over time. Second, we look at the accuracy of hospitals' budgets. Specifically, we look for signs of optimism bias, in terms of budgeted surpluses exceeding actual surpluses. Again, we look at variations between hospitals and over time. While the analysis is predominantly descriptive and exploratory, we are inspired by, and find a theoretical basis in, the project management literature and the theory of optimism bias and strategic misrepresentation (Flyvbjerg, 2011).

There is a limited amount of past research on this topic. Most past research on accounting in health care has investigated the financial effects of reforms or specific accounting initiatives, but studies have made scarce use of financial data from hospitals (Malmmose, 2019). This article adds to the literature by providing a description and an analysis of the relationship between budgeted and actual results. Furthermore, the analysis considers a health care system where NPM reforms have made budgeting an important tool for hospitals to facilitate the necessary funding of investments. This study also adds to the existing literature by including the whole of the hospital sector in the analysis. Thus, rather than looking at specific cases at the micro-level, our aim is to describe how an entire sector has adapted to an NPM-inspired reform.

The article is organized as follows: In Section 2 we describe in more detail the institutional background of the Norwegian health care system. The theoretical foundation for the analysis as well as relevant prior studies are described in Section 3. Data and methods are presented in Section 4, and results in Section 5. Section 6 provides a discussion of the results, and the article ends with some concluding comments and suggestions for further research.

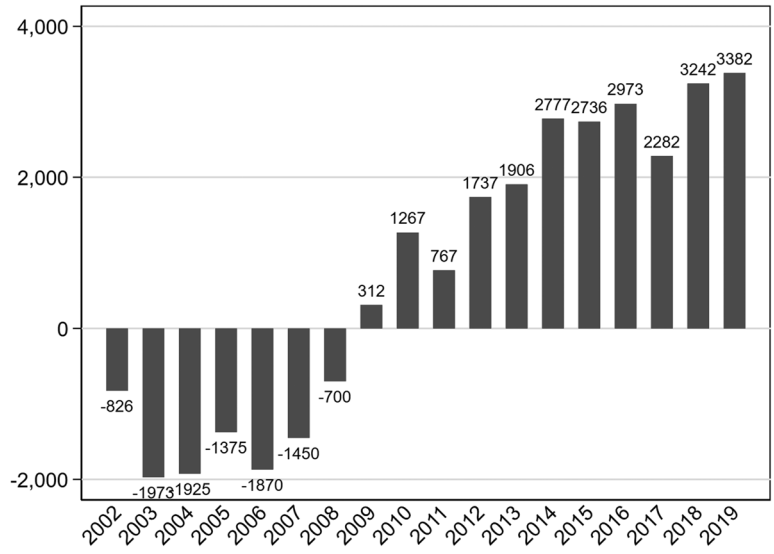

FIGURE 1 Total deficits and surpluses in the hospital sector in million Norwegian kroner (NOK).[2]

2 | THE NORWEGIAN HOSPITAL SECTOR

The hospital reform of 2002 transferred ownership from 19 counties to the state and reorganized hospitals into semi-independent health trusts organized under four (originally five) regional health trusts, termed "regional health authorities" (RHAs). Under a purchaser–provider split, the RHA is the purchaser, and the individual health trusts are the providers (Saunes et al., 2020). Health trusts are independent legal bodies with control over both personnel and capital (Hagen & Kaarbøe, 2006). At the time of the reform, there were 42 health trusts (Magnussen et al., 2007). The number has since reduced steadily due to mergers. Today, there are 28 health trusts, of which 20 are hospitals (Saunes et al., 2020). The most recent merger took place in 2011.

In the period immediately period after the hospital reform, budget deficits increased, mainly as a result of a higher level of activity than initially planned (Tjerbo & Hagen, 2009). This resulted in the health trusts frequently receiving supplementary funds from the state. Supplementary funding represented a potential failure of one of the main reform goals, because it meant that the health trusts had neither controlled costs nor managed to set aside funds for future investments. Secondly, while the implementation of private sector accounting principles was rapid, the process of actually translating these principles to the public health care sector took many years (Kaarbøe & Robbestad, 2016). It was not until 2009 that health trusts overall managed to run with surpluses and thus to set aside money for investment projects as intended by the reform.[1]

Figure 1 shows annual aggregate deficits/surpluses for the period 2002–2019 in nominal values.

For hospitals, annual depreciation costs represent nonpayable costs that can be used to fund new investment projects within the regional trust. In some cases, RHAs will pool these costs for all their hospitals in order to generate funds. For projects exceeding NOK 500 million state loans are available, but not guaranteed, and state loans will only cover 70% of the investment costs. Thus, surplus budgeting is necessary for health trusts in order to raise funds for future investment projects. In setting goals for surpluses, health trusts are faced with a trade-off between treating patients now and securing funding for future investments. To reduce this trade-off, long-term budgets also include projections of improved efficiency. The practical implication of this is that a hospital budget is subject to uncertainty as regards both to demand and actual level of efficiency. Given this, it is of interest to determine the extent to which health trusts are able to accurately forecast operating results.

The financing of the health trusts stems from a combination of block grants and activity-based financing (ABF). ABF is a prospective payment system based on diagnosis-related groups (DRG) and was introduced in 1997 (Saunes et al., 2020). For most of the study period, there was a 50/50 split between block grants and ABF. The health trusts use accrual accounting, as opposed to the cash-based accounting they used previously. In the official reform documents, it was argued that cash-based accounting had contributed to low awareness of the financial situation among the hospitals (Ot.prp. nr. 66 (2000–2001), 2001).

Health trusts are obliged by the Health Enterprise Act to provide budgets, and the boards are obliged to make sure that activities are in accordance with the approved plans and budgets (The Health Enterprise Act, 2001, § 28). The budget year follows the calendar year. The budgetary process starts early in the year, prior to the budget year, when a steering document is sent to the RHAs by the central government. This document contains the demands made by central government and states the share of the state budget due to be allocated to the RHAs. Based on this information, the RHAs formulate a letter to the individual health trusts setting out the limits for on the next year's budget. The health trusts usually receive this letter from the RHA during the summer. The health trusts' budgets are then decided at the end of the year and further updated in February of the budget year in order to compensate for changes in the DRG tariffs (Kjøllesdal, 2014).

The budgets are mainly based on planned activity but also use the previous year's budgets and accounts and are often referred to as an incremental process (Fallan et al., 2010; Nyland & Pettersen, 2018). The health trust can, however, choose how they want to undertake budget planning. This freedom reflects the managerialist aspects of the NPM ideology, which stresses the importance of "letting managers manage" (Boston, 2019). Different health trusts might thus have local models for allocation of resources, which, again, might influence the size of the budget surplus.

As noted, the main reason for budgeting with surplus is to finance investments. Hospital investments are here defined as the acquisition of new medical equipment, maintenance, and construction of buildings, acquisition of land, and acquisition and maintenance of IT systems. As noted above, when planning investment projects exceeding a cost of NOK 500 million, health trusts can apply for loans from central government. Loans from private actors are not allowed. Usually, individual health trusts make the investment plans themselves through proposals that have to be approved by the RHA (Saunes et al., 2020). Until 2013, they could borrow up to 50% of the investment cost; thus, they needed 50% equity in advance, saved up through budget surpluses and depreciation. The depreciation period for new investments was set to 20 years. After 2013, the share of loans was increased to 70% of the investment cost, thus reducing the equity requirement. At the same time, the depreciation period was increased to 25 years.

3 | THEORETICAL FOUNDATION AND PRIOR STUDIES

This study is inspired by the project management literature (see e.g., Flyvbjerg, 2011). This literature discusses how project managers tend to systematically overestimate the benefits and underestimate the costs of investment projects, leading to cost overruns and budget deficits. According to Flyvbjerg (2011), there are three main reasons for the failure of projects: bad luck, optimism bias, and strategic misrepresentation. The first of these, bad luck, is quite self-explanatory: Flyvbjerg argues that bad luck, if true, should have a mean distribution of zero.

The second reason, optimism bias, is an issue of flawed decision-making whereby decision makers overestimate benefits while underestimating both costs and time (Flyvbjerg, 2011). The term originally stems from psychology and behavioral economics, and it argues that people generally overestimate the likelihood of positive outcomes and underestimate that of negative outcomes. The definition from psychology is "the difference between a person's expectation and the outcome that follows" (Sharot, 2011, p. 941); it can thus be empirically measured as the difference between expectations prior to an event and the actual outcome. Translated into our case, of hospital budgeting, we could say that the optimism bias is present if the health trusts underestimate expenditure (or, equally, overestimate the level of efficiency) and/or overestimate the size of the income. Such planning errors usually happen as a consequence of inside view planning (Flyvbjerg, 2011; Kahneman & Tversky, 1979). Inside view planning is characterized by viewing one's

situation as unique, as well as planning future results by extrapolating past and current trends, rather than taking an outside view. The outside view consists of learning from similar cases while ignoring specific details (Flyvbjerg, 2011).

The third reason for failure, strategic misrepresentation, is a more political explanation than optimism bias, being an agency-related problem whereby one deliberately underestimates costs or overestimates benefits in order to secure funding for a project (Flyvbjerg, 2011). Empirically, it is difficult to separate strategic misrepresentation from optimism bias.

In this article, the focus is on the financial surpluses that make investments possible, rather than on specific investment projects. However, we would argue that the concepts of bad luck and optimism bias provide a suitable framework for our analysis because the accuracy of budgets can be subject to the same flaws as investment projects. In addition, accuracy of the budgets directly influences funding and the ability to take up loans for investment projects. While our main focus is to investigate the degree of optimism bias, we also acknowledge that there are other theories that can help explain the actions and outcomes of decisions made in health trusts when it comes to the planning of future surpluses. For instance, contingency theory stresses the importance of management, and principally proposes that there is no universal best way for a corporation to organize because it will always be dependent on a combination of internal and external factors (Otley, 1980). In addition, within the framework of decision-making theory, we find Herbert Simon's concept of satisficing, which stresses that managers often make decisions that are not necessarily the best or optimal, but are satisfying enough (Painter, 2019).

We formulate the following questions:

Q1: To what extent do health trusts plan for surpluses in their budgeting?
Q2: How accurate are the budgets? Do the data support a hypothesis of bad luck or is there evidence of optimism bias?
Q3: Is there an association between the structural and/or organizational characteristics of the health trusts and deviations between budgeted and actual results?

3.1 | Literature review

Research conducted in Norway prior to the NPM reforms demonstrated that there had been systematic differences between budgeted and actual expenditures in the period 1989–1992 (Pettersen, 1995). One finding was that some hospital managers did not use accounting information from previous years when setting new budgets because the proposed budgets were always reduced by the county councils later.

A decade later, Nyland and Pettersen (2004) performed a case study in one of the largest university hospitals in Norway while it was going through the 2002 hospital reform. The empirical material was a combination of budget and account documents and in-depth interviews. The findings supported earlier findings, as the authors found deviations between budgets and accounts with large degrees of overspending. Similar findings emerged from a case study of a university hospital undertaken by Fallan et al. (2010).

As demonstrated by Magnussen (2016), the Norwegian hospital sector ran with overall deficits every year from 2002 to 2008. A result of this was that the health trusts needed supplementary funding, a situation which has been characterized as soft budget constraints imposed by the central government (Tjerbo & Hagen, 2009, 2017). A situation of soft budget constraints effectively takes away the credibility of budgets, as there are no consequences of failing to operate within them.

Looking outside of Norway, Eldenburg and Soderstrom (1996) used a sample of US hospitals from the State of Washington to investigate the difference between actual and budgeted contractual adjustments, that is, the difference between charges and reimbursements. They found a systematic overestimation of this difference in the period 1977–1992 and explained these findings as responses to changes in government regulations, as the forecasting errors were most present when the budgeted patient volumes affected the revenue.

Studies of budgeting from other public sector organizations and local governments can also offer some valuable insights. There are few studies of budgeting in the public sector, and those that exist are mainly qualitative (Anessi-Pessina et al., 2016). In their study of budget control in Swedish municipalities, Johansson and Siverbo (2014) found that municipalities with what they termed "budget turbulence" put more emphasis on reaching their budgeted targets by increasing their budget control. A study of budgeting in local governments in Japan revealed that nonfinancial information also plays a large role in budget setting (Kuroki & Motokawa, 2021). Such factors can, for instance, be performance measures that are not related to financial outcomes.

One of the aims of the current study is to look for associations between organizational and structural characteristics of the hospitals. Several studies have discussed which hospital characteristics are important in terms of performance and managerial issues (e.g., Brand et al., 2012; Ridgely et al., 2020). A common observation is that the association between hospital characteristics and performance is highly context-specific. Moreover, in general, individual characteristics seem to have a weak effect on performance in statistical analyses (Brand et al., 2012). However, the most persistent association is between hospital size and performance. Although the direction of the association varies, most studies find this to be positive (Ridgely et al., 2020). Ownership status and market structure are also factors commonly considered. García-Lacalle et al. (2020) found that case mix complexity was negatively associated with financial performance. A systematic review of the role of hospital managers concerning quality found indications that mangers' time spent on quality and safety improved a hospital's performance on these measures (Parand et al., 2014). Organizational culture- and human resources-related attributes, such as staff support and staff morale, are found to have positive effects on hospital performance (Ridgely et al., 2020).

4 | METHODS AND MATERIALS

This study focuses on three variables: the *size* of the budgeted result, the *deviation* between the actual and budgeted results, and the *accuracy* of budgets in Norwegian health trusts. We consider the period between 2011 and 2019, during which the health trusts (mostly) managed to operate with surpluses and without supplementary funds.

The analysis is conducted in two stages. The first stage provides a descriptive analysis in which we map the budgeted results, actual results, and budget deviation over time and across health trusts. We also test a hypothesis of bad luck, that is, a zero mean deviation of actual vs. budgeted result. Both budgeted and actual results are calculated as a percentage of the total operating costs (TOC) in the health trusts.

In the second stage, we seek associations between structural and organizational hospital characteristics and (1) planned surplus, (2) degree of optimism, and (3) budget accuracy. We run three separate panel data regression models using each of these three is as dependent variable. In model 1, we test which factors are associated with the size of the budgeted result (using the variable *Surplus size*), measured as the health trusts' budgeted result as a percentage of the TOC. In model 2, we test which factors are associated with the degree of optimism, measured as the deviation between actual and budgeted result as a percentage of the TOC (using the variable *Deviation*). Negative values on this variable would indicate some degree of optimism as they indicate that the health trusts have budgeted in expectation of a better result than they actually achieved. On the other side, positive values indicate absence of optimism (and thus some degree of pessimism). In model 3, we test which factors are associated with budget accuracy. Here, we test how close to the actual result the budgeted result is, in either direction, by looking at the absolute deviation between planned and actual result (*Accuracy*). With this variable, the direction of the deviation does not matter, as it only measures the distance from zero. In all the models, we use fixed effects regression with both RHA- and time-fixed effects. Fixed effects panel data regression allows us to control for unobserved factors varying both across RHAs and over time (Mehmetoglu & Jakobsen, 2017)

The inclusion of the independent variables is based on (1) past studies of favorable hospital characteristics, (2) pragmatic considerations of which factors might be associated with the dependent variables, and (3) data

TABLE 1 Presentation of independent variables used in regression models.

Model 1: Surplus size	Model 2: Optimism	Model 3: Accuracy
Size	Size	Size
Capital intensity	Capital intensity	Capital intensity
Case mix index	Case mix index	Case mix index
30-day survival	30-day survival	30-day survival
Deviation (lagged)	Surplus size	Surplus size
Deviation squared (lagged)	RHA dummies	Deviation negative current year
RHA dummies	Year dummies	RHA dummies
Year dummies		Year dummies

availability. Street et al. (2010) offer examples of typical hospital characteristic variables used in analyses of hospital costs. We took inspiration from their work when deciding on which variables to include.

Size is one of the most widely used variables. Large health trusts are, on the one hand, complex organizations, but they may, on the other hand, face less uncertain demand. Without any a priori hypotheses, we include size as an important structural variable. As a proxy for size, we use TOC, which include depreciation costs and exclude pension costs, in NOK billions deflated to 2019 values.

Next, we use depreciation costs as a share of TOC as a proxy variable for the relative level of capital (buildings, medical equipment, etc.). Since this is measured as a share of TOC, it effectively means that the variable measures the capital intensity of the health trusts. Again, we have no a priori hypotheses. On the one hand, we anticipate that health trusts with low capital intensity (depreciation costs) have older medical equipment and will therefore budget to achieve larger surpluses because they need funds for new investments. On the other hand, health trusts with low capital intensity might have both poorer operating conditions and productivity and might therefore lack the ability to realize a high surplus.

Two frequently used control variables are case mix index and quality. Generally, costs are expected to vary more for complex patients; thus, hospitals treating more complex patients may be more likely to see their performance—in this case budgeting outcomes—affected. We measure case mix as the total number of DRG points divided by total discharges. Concerning quality, one might hypothesize that a high level of quality in the services may come at the expense of financial control. Hospital quality is a complex concept, and there is no clear agreement on how it should be operationalized. Here, we use 30-day survival rate after admission. Even though this is not a perfect measure of hospital quality, it is a common quality indicator to use when measures of quality for each patient are not available (Street et al., 2010).

Size, capital intensity, case mix index, and quality indicator are included in all models, along with RHA- and time-fixed effects. With time-fixed effects, we control for factors affecting all health trusts equally, such as national policies. In the analysis of the size of budget surplus (model 1), we include a lagged version of *Deviation* to test whether past budgeting mistakes are taken into account when setting the budget. Since both high and low values on this variable indicate inaccurate budgeting in the previous year, this variable is squared. In the model testing for accuracy (model 3), a dummy version of *Deviation* (1 = negative deviation) is added to see if there are differences in the budgeting accuracy for those with negative vs. those with positive deviation. Lastly, a relevant factor to test for in model 2 and model 3, which test for optimism and accuracy, is whether the surplus size affects optimism or accuracy. Therefore, the budgeted result (which is the dependent variable in model 1) is included as an independent variable in these models. The explanatory variables used in each of the models are summarized in Table 1.

As all hospitals in this sample are publicly owned, we do not test for ownership status. Data on managerial activity and human resources-related aspects are not available and are therefore not included in the analysis.

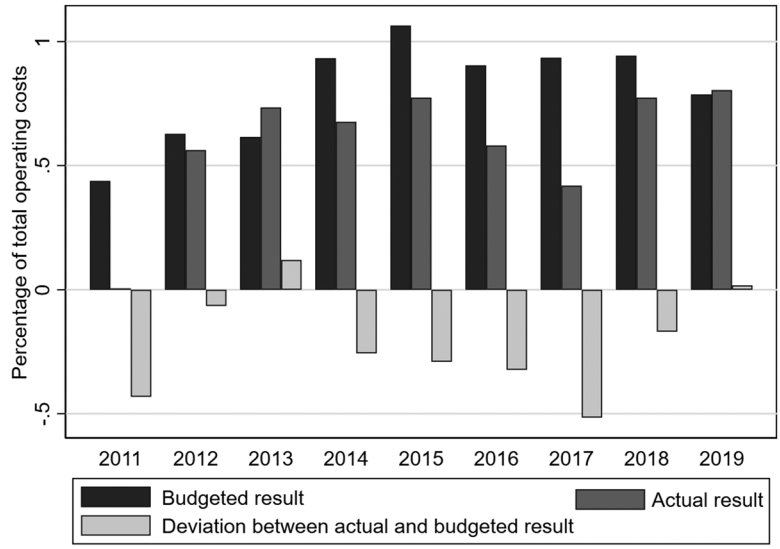

FIGURE 2 Budgeted result, actual result, and deviation as percentages of total operating costs.

Most of the data are publicly available. The data on actual results[3] and hospital characteristics are derived from Statistics Norway (Statistisk sentralbyrå, 2021), and the data on 30-day survival rates are from the publicly available National Quality Indicator (NKI) registry from the Norwegian Directorate of Health (Helsedirektoratet, 2022).[4] The data used to calculate the case mix index are derived from The Norwegian Patient Registry. The data on budgeted results are derived from budgeting documents available from the health trusts' websites. We use the most updated budget numbers available. For some health trusts, a few of the oldest documents were not available online but were obtained by contacting the health trusts directly. The budget data were manually retrieved from these documents and merged into the data set consisting of the hospital data. There is thus a risk that errors may have occurred from the manual plotting of the numbers from the documents into the data set and that the health trusts themselves have errors in their budget documents. However, this eventuality has been carefully reviewed. While there is a total of 20 health trusts, only those with acute care hospitals are included in the analysis. The final data set has a panel structure with 19 units (health trusts) observed yearly for 9 years, resulting in a total of 171 observations. Table 2 shows the descriptive statistics for the included variables, and Table A3 in the Appendix shows a correlation matrix of the included variables.

5 | RESULTS

5.1 | Stage 1: Descriptive analysis

Figure 2 shows the average unweighted values for all the health trusts. We note that, on average, the health trusts budget with a positive result of between 0.5% and 1% of TOC. We see further that there are only 2 years, 2013 and 2019, where the actual results, on average, were better than the budgeted result. This implies that, on average, health trusts were too optimistic in their budgeting in most of the years between 2011 and 2019.

We see that the 2 years with a positive deviation also have fairly accurate budgets. In addition, we see that two of the years with a negative deviation, 2012 and 2018, had a somewhat accurate budgeted result despite such deviation.

We note that the budgeted result increased somewhat over time. In the first half of the study period, the budgeted result was less than a 0.5% of TOC, and it peaked at around 1% of TOC in 2015. After the positive difference in 2013, the budgeted result made a leap from 0.61% to 0.93% in 2014. Thereafter, the budgeted result remained stable, at

TABLE 2 Descriptive statistics.[5]

Variable	Obs	Mean	SD	Min	Max
Surplus size (% TOC)	171	0.805	1.247	−4.914	3.509
Deviation (% TOC)	171	−0.212	1.347	−4.827	3.010
Deviation absolute (% TOC)	171	0.980	0.946	0	4.827
Total operating costs (NOK billion)	171	6.215	4.248	1.671	22.258
Capital intensity (% TOC)	171	4.464	0.977	2.626	7.058
Deviation negative	171	0.497	0.501	0	1
Case mix index	171	0.207	0.022	0.161	0.271
30-day survival	171	95.079	0.551	92.8	95.548

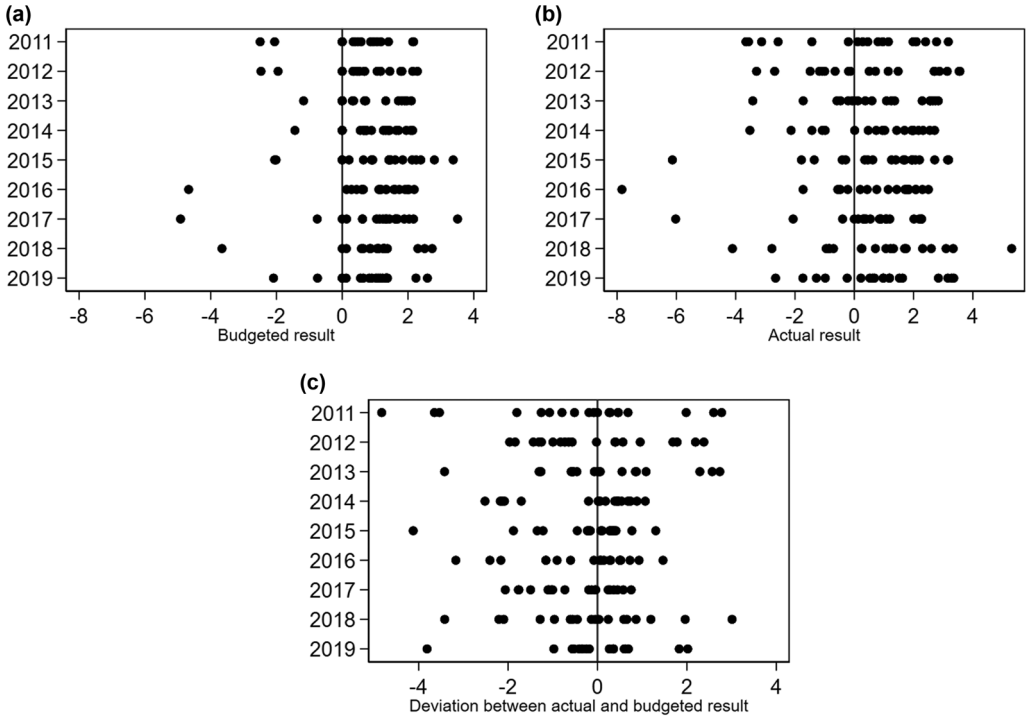

FIGURE 3 Spread of budgeted result, actual result, and the deviation between actual and budgeted results over time.

around 0.9% and 1% of TOC, until 2018. The actual result, on the other hand, does not seem to follow any specific trend.

We now turn to variations within years and between health trusts. First, Figure 3 shows variation within each year, with each dot within a year representing a single health trust. Figure 3a shows the distribution of budgeted results, Figure 3b shows the distribution of actual results, and Figure 3c shows the distribution of the deviation between actual and budgeted results.

We note that, while the average values were rather low, there are large variations between the health trusts. The majority of health trusts are budgeting with a surplus (Figure 3a), but the variation is larger than that shown in Figure 2. We also see that every year, one or two health trusts are budgeting with a negative result. This figure does not indicate any changing pattern over time. As we see from Figure 3b, there are substantially more health trusts with a negative actual result than with a negative budgeted result.

While the average numbers for the deviation between actual and budgeted results from Figure 2 are between −0.52 and 0.12, the minimum and maximum values for individual health trusts (Figure 3c) are much larger, at −4.8 and 3, respectively. We see that the deviations are approximately evenly spread above and below zero for the entire study period. Thus, inaccuracy in budgeting goes both ways: Some health trusts had better actual results that they budgeted for. Within years, we would expect a mean deviation around zero unless there were significant changes in the form of unexpected budget cuts/increases or exogenous demand side shocks. A hypothesis of mean deviation equal to zero shows that 2017 is the only year in which the deviation is significantly different from zero. See Table A1 in the Appendix for full results.

Figure 4 shows the variation of budgeted results, actual results, and the deviation between the two within each health trust. Whereas Figure 3 showed variation within each year, Figure 4 shows variation within each health trust. Note that the observations are not sorted by time, but by size of surplus/deficit. While we saw that there were negative budgeted results every year, we see that it is the same seven health trusts that have all the negative budgets.

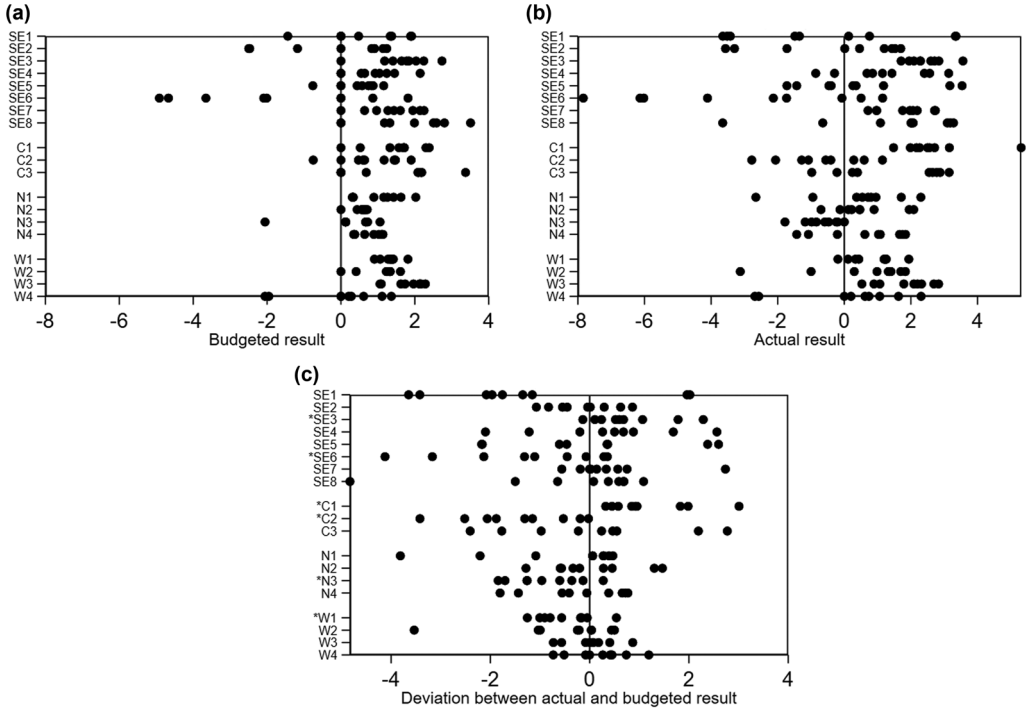

FIGURE 4 Spread of budgeted result, actual result, and the deviation between actual and budgeted results within each health trust.

Four of these are in RHA South-East, and one health trust (SE6) is responsible for five of the 13 incidents of negative budgeted result. Although 16 of 19 health trusts had a balanced budget at least once, presenting a balanced budget is the exception rather than the rule. In only 23 of 171 cases have health trusts presented a budgeted result of zero.

While Figure 3c revealed that the number of observations above and below zero were somewhat equal within each year, Figure 4c shows that this is far more skewed within each health trust. In the cases of SE3 and C1, most of the observations are on the positive side, while the opposite situation holds for C2 and W1.

A hypothesis of zero mean deviation within health trusts is rejected for six out of the 19 health trusts (marked with an asterisk in Figure 4c). See Table A2 in the Appendix for full results. For these six health trusts, we can conclude that bad luck is not the reason for inaccurate budgeting in the period 2011–2019. Further visual inspection of the figure indicates that some of the health trusts without a significant difference still have a fairly skewed distribution, for instance SE1 and N1.

5.2 | Stage 2: Regression analysis

The descriptive data reveal large variations between health trusts with regard to budgeted results, actual results, and the deviation between the two. In this second stage analysis, we look for associations between these and structural, organizational, and economic variables.

We exploit the variation between health trusts but use RHA- and time-fixed effects. The motivation for RHA-fixed effects is to adjust for potential differences in governance and organization between the RHAs. Time-fixed effects will capture time-specific effects, namely variations in national health policy. Since annual observations for health trusts

are not likely to be independent, we use robust standard errors clustered by health trusts (Mehmetoglu & Jakobsen, 2017). The regression models are presented in Table 3.

In model 1, the focus is on the (relative) size of the budget surplus. Note that there are 152 observations instead of 171 because of the lagged variable. Neither the size of the health trust nor the capital intensity has any significant effect on the budgeted results. However, the size of the deviation between actual and budgeted results in the previous period has a positive and statistically significant impact. The association does not seem to be linear, however. We depict this (partial) association in Figure 5. Remember that a negative deviation implies that the budgeted result was higher than the actual result. We see that the predicted budgeted result in the following year is at its highest level when the actual result in the previous year was slightly better than the budgeted result. We also see that if the actual result substantially deviated from the budgeted result, in either direction, the budget result in the following year tends to be low. The highest deviation (especially on the negative side) tends to be followed by a negative budgeted result in the following year. The R^2 value suggests that this model explains 40.7% of the variations in the budgeted result. An identical model without the lagged deviation explains 22.4% of the variation (not reported here), indicating that previous deviation has an important impact on budget decisions.

In model 2, the focus is on the degree of budget optimism; thus, we use the deviation between actual and budgeted results as the dependent variable. Negative coefficients mean that the budgeted result is higher than the actual result and thus indicate increased optimism, while the opposite indicates absence of optimism (pessimism). As in model 1, we see that size and capital intensity do not have any significant effect on optimism. There is a (weak) positive association between the size of the budgeted surplus and the deviation. Thus, health trusts with a higher budgeted surplus tend to get a higher result than budgeted for. Increased budgeted surplus is therefore associated with a lower degree of optimism. Compared to the other models, model 2 has a rather low R^2 value of 0.079. We suspect that the relatively low explained variance in this model is partly due to how the dependent variable is measured. Since the "preferable" values are in the middle (i.e., zero deviation between budgeted and actual results), the equally "unpreferable" values lie on either side of the scale. This could possibly lead to situations where they cancel each other out, resulting in a low R^2 value for the model. As stated above, a large part of the explained variance in model 1 stems from the inclusion of the lagged deviation variable, which can lead to autocorrelation. Also, model 2 does not include the dummy variable *deviation negative*, as is the case in model 3. This information is contained in the dependent variable and including the variable *deviation negative* could therefore cause problems of endogeneity in the independent variables.

In model 3, the focus is on the degree of accuracy. Thus, as the dependent variable is the size of the deviation in absolute numbers, we do not make a difference between negative and positive deviations from the budgeted result. In this case, negative coefficients are associated with lower deviations and thus higher accuracy. Here, size seems to matter in the sense that larger health trusts are more accurate in their budgeting than smaller ones. This effectively means that when the size (in terms of TOC) of the health trust increases by NOK one billion, the (absolute) deviation decreases by 0.05 percentage points, and the accuracy of the budgeted result thus increases. This is the only model where the case mix index has a significant impact on the dependent variable. The positive coefficient suggests that when case mix complexity increases, the accuracy of the budgeted result decreases. Neither size, quality, nor capital intensity has any significant effect, indicating that these factors do not affect the accuracy of the budgeted result.

Including a dummy variable for negative deviation indicates that there are differences in accuracy between the health trusts that have a negative and a positive deviation from their budgeted result. With a significant coefficient of 0.45, we see that when health trusts have a negative deviation and the budgeted result is higher than the actual result, the accuracy of the budgeted result is 0.45 percentage points worse than when the health trusts have a higher actual than budgeted result.

TABLE 3 Regression models

Variables	Model 1 Surplus size	Model 2 Optimism	Model 3 Accuracy
Total operating costs	−0.0228	0.0174	−0.0500***
	(−0.0895 to 0.0439)	(−0.0463 to 0.0812)	(−0.0714 to −0.0286)
Capital intensity (% TOC)	−0.443*	−0.0799	0.0288
	(−0.975 to 0.0889)	(−0.542 to 0.382)	(−0.183 to 0.241)
Case mix index	16.31	−3.321	10.79**
	(−4.673 to 37.30)	(−26.09 to 19.45)	(2.349 to 19.23)
30-day survival	0.252	0.317	0.00312
	(−0.264 to 0.767)	(−0.583 to 1.217)	(−0.332 to 0.338)
Deviation (t − 1)	0.215***		
	(0.0693 - 0.361)		
Deviation squared (t − 1)	−0.102***		
	(−0.170 to −0.0341)		
Budgeted result (% TOC)		0.188**	−0.0836
		(0.00776 to 0.368)	(−0.204 to 0.0365)
Deviation negative (0 = positive deviation)			0.448***
			(0.137 to 0.758)
Constant	−24.27	−29.31	−1.192
	(−71.70 to 23.17)	(−112.6 to 53.93)	(−32.18 to 29.79)
Observations	152	171	171
R^2	0.407	0.079	0.250
RHA FE	YES	YES	YES
Year FE	YES	YES	YES

Note: Robust confidence intervals in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

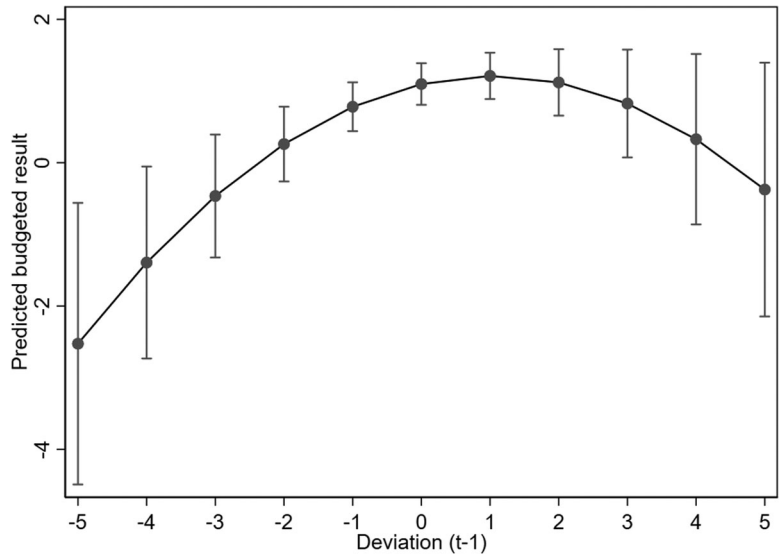

FIGURE 5 Association between lagged deviation and size of budgeted surplus.

6 | DISCUSSION

In this section, we discuss the results of our analysis, giving adequate response to the research questions we posed earlier, and draw some conclusions. Regarding the first question, the extent to which health trusts plan for surpluses, we find that most of the health trusts in most of the years plan for a surplus. However, on average we find that the health trusts budget with a relatively small (0.5%–1%) surplus. There are variations, but we rarely see hospitals with budgeted surpluses that exceed 2% of TOC. The requirement to operate with a surplus can be seen as a marketization aspect of an NPM reform (Ferlie, 2017), in the sense that health trusts must follow the same accounting principles as the private sector. Studies from other countries have shown that the focus on economic factors in health care has increased as a consequence of NPM (cf. Kurunmäki et al., 2003). Budgeting with surpluses aligns with this finding, and also supports the perception among physicians in Norway that the hospital reform led to both an increased focus on profitable patients and a generally increased focus on economic variables (Kjøstolfsen et al., 2021). Thus, there is a question of whether the perceived impression of focus on profit and economy overstates its real importance in the running of health trusts. It could be argued that the level of surplus budgeting merely supports a moderate increase in the rate of investments and that the main focus of health trusts is more on "staying within budget" than on generating profit. On the other hand, we would like to be able to explain in more detail the variations between health trusts. The fact that failing to meet the budgeted result in the previous period was associated with the size of the budgeted surplus might suggest that the past result is taken in consideration when the new budget is set. Still, we suspect that variations between health trusts are explained more by trust-specific factors than by general structural or organizational factors. Thus, we argue that more research is needed, such as in-depth studies of hospitals with different "result profiles."

Regarding our second question of how accurate health trusts are in their budgeting and whether inaccurate budgeting was due to bad luck or optimism bias, we find that the accuracy of the budgeted results is both overestimated and underestimated, with a deviation between actual and budgeted results as a percentage of TOC spreading from approximately negative 4 to positive 4. Whether this is due to bad luck or optimism bias is not straight forward to determine with these results. We will therefore start of by discussing this. First, looking at the average deviation between actual and budgeted results (Figure 2), it would seem that health trusts tend to be too optimistic in their budgeting. Within our period, from 2011 to 2019, the actual results, on average, only exceeded the budgeted result in 2 years. Still within

years, we cannot reject a hypothesis of mean deviation across health trusts being zero and thus reflecting bad luck. However, when we turn this around and look within each health trust across the years, the argument for bad luck is weakened. We find that for approximately one third of the health trusts, the deviation between actual and budgeted results is significantly different from zero. Thus, there is a strong indication that some health trusts systematically either overbudget or underbudget.

On average, there a is sign of optimism bias, in the sense that the actual result tends to be lower than the budgeted result. Perhaps surprisingly, there are also examples of hospitals understating their results ("pessimism bias"). We also note that within one RHA (Central), one health trust has a clear optimism bias (C2), and another has a pessimism bias (C1). As the RHA will have overall budget constraints, budgets within an RHA will not be independent of each other. In this case, a health trust that is running with surpluses over time might fear that its budget will be reduced in order to increase funding in other health trusts that regularly run with a deficit. In this case, "pessimism bias" might be a viable strategy for the health trust to maintain its present level of income.

Neither the descriptive analysis nor the regression analysis indicates any form of institutional learning over time. As pointed out in Hood (1991), measurements and quantifications are important parts of NPM; thus, one would hope for some form of learning over time. What we do find is that when hospitals fail to reach their target, they will tend to provide a small (but not necessarily *smaller*) budgeted result the following year, indicating cautious behavior. Caution is, however, not necessarily associated with learning. A relevant question is therefore whether Flyvbjerg's (2011) term "strategic misrepresentation" may play a part here. We can, however, neither confirm nor reject this with the data available.

Another possible explanation for the lack of learning is provided by Lapsley (2008). In the relationship between managers, as the action takers, and auditors as verifiers of the actions, a situation may arise wherein "The Audit Society" starts to form the actions taken by managers, rather than evaluating them. This might lead to what Lapsley (2008) refers to as a "tick-box attitude," where managers put too much emphasis on following auditing templates rather than actively managing. It is possible that such a situation may impair some of the potential learning that the management could have gained from past mistakes.

Regarding our third research question of whether there are associations between the structural and/or organizational characteristics of the health trusts and deviations between budgeted and actual results, we find that there indeed are such associations. These associations, however, depend on the way we measure the deviation. When we measure the deviation in real terms (model 2), none of the structural or organizational variables show any significant effect, but when we measure the deviation with absolute numbers (model 3), we find that both the size and case mix of the health trust is associated with the accuracy. We will further elaborate on the findings below.

Even though we find some indications for optimism bias in the descriptive analysis, we do not find any structural or organizational characteristics that are significantly associated with the degree of optimism in model 2. We do find that the size of the budgeted result has a significant effect on the degree of optimism. The positive coefficient indicates that a higher budgeted result is associated with a lower level of optimism, indicating that the health trusts are putting more emphasis on budgeting processes when they need to save up larger amounts of capital.

We find that both structural and organizational variables have a significant influence on the accuracy of the budget. First, the size of the health trusts has a significant negative coefficient, meaning that increased size is associated with increased accuracy. This is in line with findings of previous research concerning which hospital characteristics are associated with various measures of performance. Second, the impact of the case mix on accuracy is not surprising and is in line with García-Lacalle et al. (2020). This shows that high complexity increases the difficulty of budgeting. An explanation for size and case mix having an effect in model 3 and not in model 2 is that the case mix affects the health trust deviation in both directions at the same time (i.e., both over- and underbudgeting), and model 3 is able to capture this effect.

We also see that health trusts with a positive deviation between actual and budgeted results seem to be more accurate in their budgeting than those with a negative deviation. Thus, health trusts with optimistic budgets have

lower accuracy than those with more pessimistic budgets. One explanation for this might be that the focus on budget accuracy is weakened once they realize that the actual result will not be as good as planned.

A key premise in this analysis has been that the main motivation for running with a surplus is to raise funds for new investments. We proposed two possible effects of health trusts having a high stock of capital: (1) because high capital stock reduces the need for investments, and thus surplus or (2) because low capital stock makes hospitals less efficient and therefore unable to provide a surplus. We found no significant effect of capital intensity in either of the models. However, looking at the direction of the coefficient in model 1, we see that there is an indication of a negative association between capital stock (relative) and budgeted result. We do not know which of these is the correct interpretation, and the association is weak.

We would also anticipate that health trusts that fail to reach their budgeted result may compensate by reducing the level of investments in medical-technical equipment the following year. Ideally, we would test whether failure to reach a budgeted surplus leads to a change of investment plans. Unfortunately, we did not have data on planned investments. Instead, we tested this by using data on change in investment from one year to another and tested if these changes were associated with the deviation between actual and budgeted results. However, this analysis did not yield any significant results and is therefore not reported here.

There are some limitations to this study. First is the reliability of the empirical data. As the data on the actual results are from an official statistics source, while the data on the budgeted results are manually derived from budgeting documents, there is a chance that the numbers from the different sources are calculated using slightly different definitions. This is, however, something that we cannot control. Second, with only 19 acute care health trusts, the total number of observations in the data used for this analysis is relatively low, which would make the analysis less representative and the findings less generalizable. However, it includes repeated observations, which increases the sample size significantly and allows for more precise statistical estimations. Despite the low number of observations, the data remain representative as they cover the whole "population" of health trusts. Due to the large variations found among the health trusts in this exploratory study, further in-depth case studies are needed to gain more insight into this topic, which is still of high relevance for health care managers, policymakers, and academics. However, we believe that hospital managers could take some inspiration from this study by using these findings as a way of taking "the outside view" when planning future budget surpluses. By gaining more insight into the budgeting situation in the whole sector over a long period, managers should be able to gain a better perspective of the budget situation in their own health trust, and not see their situation as unique to the situation of all the other health trusts.

Our analysis is inspired by the project management literature and the corresponding hypothesis of optimism bias, and our findings indicates that some degree of optimism bias might be present. However, as mentioned, we acknowledge that there are other theories that can be useful in explaining these findings, and we propose that the picture that emerges from our analysis can also fit into a framework provided by contingency theory, namely that there is no is no universal best way for a corporation to organize. This theory stresses the importance of management and is thus relevant for the managerialist aspects of NPM. The hospital reform was also a managerial reform, separating (regional) health trusts from daily political governance, as under the former public administration model, and providing boards and managers with freedom in the budgetary process, as long as they had a budget and an acceptable financial result. Furthermore, Herbert Simon's concept of satisficing, that managers often make decisions that are not necessarily the best or optimal, but are satisfying enough, can also be of relevance here. As Figure 3c shows a relatively stable spread of deviation over time, it seems that the sector's budget accuracy has been satisfying enough in the eyes of the policymakers in central government. This is supported by the fact that no supplementary funds for investments were given to the RHAs after 2010 (NOU 2019: 24, 2019). A possible conclusion is that health trusts do not have accurate budgeted results because they do not need to as long as the final outcome is a positive financial result. We proposed initially that Pettersen's (1995) argument of budgets as rituals rather than strategic planning documents, which was put forward in a public administration model, would no longer hold in an NPM setting 25 years later. So far, our conclusion would be that neither the deviations between the budgeted and actual results nor the degree of budget accuracy provide a definitive answer to that proposal.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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NOTES

[1] It should be noted that at the time of the reform in 2002, the hospital sector was only compensated for two thirds of annual depreciation costs. However, in the period 2007–2009, this compensation was increased. Thus, the fact that the health trusts initially were not (on aggregate) able to run with a surplus can be seen as a consequence of a combination of high levels of activity and lack of funding of the capital base inherited in 2002.

[2] Numbers until 2014 are from Magnussen (2016, p. 11); the remaining numbers are derived from the SAMDATA reports from 2019 and 2021 (Helsedirektoratet, 2019, p. 110, 2021, p. 68).

[3] In 2014, there was a change in the calculation for pension which resulted in lower costs and thus higher surpluses. The changes came after the initial budgets were released. The health trusts were thus forced to update their budgets to resemble how they would have been without the lowered costs. The adjusted budgeted results were reported in each health trust's annual report which for most health trusts were released in March 2015. To further adjust the numbers from 2014 to resemble the numbers from the other years, we used the original budgets numbers and calculated what the actual result would be by adding the deviation between the adjusted budgets and the adjusted result.

[4] One health trust had missing data for 2018 and 2019. We were able to retrieve data from each of its three subunits for these years. We used the data for the largest of the three subunits, because we did not have the necessary data to make a weighted average of these.

[5] Total operating costs are deflated to 2019-numbers.

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APPENDIX

TABLE A1 *t* Test for each year across health trusts

Year	Df	*t* Value	*p* Value
2011	18	−0.9423	0.3585
2012	18	−0.2085	0.8372
2013	18	0.3551	0.7266
2014	18	−0.9372	0.3611
2015	18	−1.0625	0.3021
2016	18	−1.1533	0.2639
2017	18	−2.5423	0.0204
2018	18	−0.4964	0.6256
2019	18	0.0648	0.9490

TABLE A2 *t* Test for each health trust across years

Health trust	Df	*t* Value	*p* Value
SE1	8	−1.8714	0.0982
SE2	8	−0.5836	0.5756
SE3	8	2.9959	0.0172
SE4	8	0.7256	0.4888
SE5	8	0.1274	0.9018
SE6	8	−2.4907	0.0375
SE7	8	1.3358	0.2184
SE8	8	−0.6254	0.5491
C1	8	4.1111	0.0034
C2	8	−3.8684	0.0048
C3	8	0.1655	0.8726
N1	8	−1.2482	0.2472
N2	8	0.1942	0.8509
N3	8	−3.6375	0.0066
N4	8	−0.6072	0.5606
W1	8	−2.5666	0.0333
W2	8	−1.3447	0.2156
W3	8	0.1503	0.8842
W4	8	0.9635	0.3635

TABLE A3 Correlation matrix

	1	2	3	4	5	6	7
(1) Surplus size (% TOC)	1						
(2) Deviation (% TOC)	0.1882	1					
(3) Deviation absolute (% TOC)	−0.1691	−0.3900	1				
(4) Total operating costs (NOK billion)	−0.0395	0.0630	−0.606	1			
(5) Depreciation (% TOC)	−0.3527	−0.1182	0.1234	0.1040	1		
(6) Case mix index	−0.01	0.0154	0.1926	0.3160	0.3897	1	
(7) 30-day survival	0.2050	0.0831	−0.1918	0.1579	−0.2011	−0.3206	1