



Do reforms reduce the magnitudes of cost overruns in road projects? Statistical evidence from Norway



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ABSTRACT

Although governments often respond to the prevalent cost overruns of transportation projects by reforming the agencies charged with overseeing the construction of projects, the transportation research literature has not provided statistical evidence as to whether such reforms assist in reducing cost overruns. This paper provides such evidence using the Norwegian road sector as a case study. The agency in question was reformed twice, from a monopolistic to a semi-monopolistic organization, and finally, to a fully competitive organization in which road construction was divided out into a separate company and privatized. In this work, we use statistical inferences to explore the related issues. The data set is composed of 1045 projects evenly distributed across the three organizational forms. The results demonstrate that the impact of the reforms has not been equal. The most important impact occurred in the final reform of full competition in which both the cost overruns and delays in construction among larger projects were greatly reduced. The second reform appears to have had a contrasting impact. For transportation research in general, we call for additional studies that will reveal the extent to which efforts carried out by governments (such as reforms) improve the efficiency of these sectors.

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1. Introduction

Cost overruns in public projects have been a pervasive problem that has raised concerns in the media and among policy makers and academics over the years (see, e.g., [Edwards \(2009\)](#)). The underlying problem of cost overruns is economic in nature because faulty cost estimates may lead decision-makers to implement inefficient policies. Consider the case of a single proposed project in which underestimated costs are presented to the decision-makers. Assume further that the net present value of the project is positive given the underestimated costs. The decision-makers may decide to implement the project. However, had they known the actual costs, they may have instead chosen among the following alternatives: (1) to not implement the project at all, (2) to implement the project in a different and more viable form, or (3) to implement other more viable projects. This situation illustrates that accurate cost estimates lead to more appropriate uses of public funds. Cost overestimates are no less a problem; had accurate estimates been available, the excess resources allocated to projects could have been used earlier in the process for other profitable projects, thus incurring benefits to users at an earlier stage.

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The concerns and implications of cost under/over overruns have come to the attention of decision-makers due to pressure from the media and academics who have vigorously pointed out the inherent problems of these overruns/under-runs. Examples of studies from the transportation literature that have investigated the problems of cost overruns include but are not limited to Flyvbjerg et al. (2002, 2004), Odeck (2004), and Cantarelli et al. (2012a and 2012b). These studies have shown that cost overruns are prevalent among transportation projects and that the causes of these overruns appear to be connected to factors that are difficult to predict and manage, in addition to poor management and control of projects at every stage, from planning to completion.

In response to the pressure exerted by the media and academics, governments have searched for ways to curb the cost overruns over the years. A common practice is to reform and/or to reorganize the governmental departments, institutions or agencies charged with planning, procurement and the construction of public works with the expectation that these efforts will reduce the average magnitudes of the overruns. Arguments for reform include a chain of command in governmental organizations that is often not clear and the lack of a robust and accountable framework in these organizations, which can lead to such expensive mistakes as the underestimation of costs and the inability to discover them in time (see, e.g., TPA (2007)). Although an extensive body of literature exists on the cost overruns in transportation projects, virtually none of these publications have studied how measures taken by governments (such as reform of the governmental authorities charged with the planning, procurement and construction of roads) have aided in reducing the magnitudes of the cost overruns.

There are however, theoretical considerations that may warrant some optimal cost overruns for individual projects. A question readily asked in this respect is what the welfare optimizing cost forecast should be. Several authors e.g., Ganuza (2007), Gaspar and Leite (1989/1990) and, Mandell and Brunes (2011) have all addressed this issue. A general conclusion that can be drawn from that literature is that if the social costs of formulating cost forecasts in the procurement process are not symmetrical around the expected cost overruns of zero, then there could be a case of forecasts to yield positive cost overruns; it all depends on the welfare costs. Despite these theoretical considerations which imply that certain overruns should be acceptable, governments still implement reforms aimed at reducing the *magnitudes* of overruns across projects. Another related theoretical perspective is connected to hedging which implies that those who make forecasts when faced with the demands to reduce overruns overestimate cost in order to avoid being accused of underestimation. Examining the extent to which this occurs also require detailed data on the procurement processes for each individual project that are difficult to obtain.

The purpose of this paper is twofold: to investigate the magnitudes of the cost overruns and to statistically test whether the reforms undertaken have reduced the magnitudes of the overruns irrespective of whether hedging occurred and/or whether the overruns were optimum. The paper uses Norway as a case study; the Norwegian Public Roads Administration (NPRA), which is charged with planning, procurement and foreseeing the construction of public roads, was reformed/reorganized twice period by the government in the 1993–2003 as a means of curbing cost overruns. The NPRA thus embodied three organizational forms during the period of study: one prior to the first reform and the two resulting from subsequent reforms. Several interesting questions are therefore addressed in this paper: (1) Did the prevalence and magnitude of the cost overruns differ and improve after the reforms? (2) Do the magnitudes of the overruns differ according to the sizes of projects and project types? (3) How do factors such as delays in construction affect the cost overruns? (4) Did the different organizational forms and sizes of the projects impact the delays, given that delays may explain the cost overruns?

The contribution of this paper to the transportation research literature is clear; this study is the first to statistically test the impact of reforms aimed at reducing cost overruns.

The remainder of this paper is organized as follows. Section 2 gives a brief account of the reforms aimed at reducing cost overruns that took place within the NPRA, and Section 3 contains a literature review of cost overruns in the road sector. Section 4 describes the data, and Section 5 discussed the statistical approach used. Section 6 presents the results, and Section 7 provides selected concluding remarks.

2. The NPRA reforms

A brief account of the reforms/reorganizations that took place at the NPRA and the associated reasons relevant to the study of the developments in cost overruns are provided below to set an agenda for the present study.

In the late 1980s, the Norwegian media broadcasted the magnitudes of cost overruns in Norwegian road projects following an investigation by the Auditor General, referred to hereafter as the AG. The AG stated that the project costs were out of control, particularly among larger projects, and that these costs would continue to escalate unless the NPRA took action. The AG argued that the large cost overruns were tantamount to deception and the misuse of public funds by the NPRA. At that time, the NPRA planned and procured all trunk roads and built 60% of the trunk roads, whereas the remaining 40% were built on tenders with the NPRA acting as the procurer. The NPRA could thus be regarded as a monopolist that could choose the 60% of the roads it wanted to build and put the rest on tenders as a procurer. Furthermore, no mechanism existed for assuring the quality of the cost estimates, such as the engagement of independent consultants to scrutinize the estimates. The AG further argued that because the NPRA acted as both the procurer and builder, it did not have an appropriate incentive to control the cost overruns for a large majority of projects, even though 40% of the construction was carried out on tenders. The major

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