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Incentives, Inflation, and Opportunism in Public Road Construction Procurement: A Comprehensive Theoretical and Empirical Synthesis

Aarav Montoya

Department of Economics and Infrastructure Policy, Universidad Nacional de Córdoba, Argentina

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Abstract: Public road construction projects represent one of the most financially significant and institutionally complex categories of public procurement worldwide. Persistent challenges such as cost escalation, time overruns, inflation exposure, opportunistic renegotiations, and suboptimal contractor performance continue to undermine value for money, fiscal sustainability, and public trust. Drawing strictly on foundational and contemporary literature in procurement theory, contract economics, and construction management, this study develops an integrated analytical framework to explain why cost overruns and inefficiencies persist despite decades of reform. By synthesizing incentive theory, transaction cost economics, political economy, and empirical findings from infrastructure projects across multiple jurisdictions, the article examines how inflation dynamics, contract incompleteness, governance structures, judicial efficiency, and strategic behavior interact within road construction procurement systems. Special attention is given to the tension between rigid rule-based procurement and flexible relational contracting, as well as the unintended consequences of competitive bidding under asymmetric information. Using descriptive analytical methods grounded in prior case-based and empirical studies, the research identifies systematic mechanisms through which contractors and public agencies respond to risk, uncertainty, and

institutional constraints. The findings highlight that cost escalation and delays are not merely technical failures but rational responses to misaligned incentives and weak enforcement environments. The article contributes theoretically by bridging construction management research with advanced procurement economics, and practically by outlining policy-relevant insights for designing contracts, managing inflation risk, and improving procurement performance in large-scale road infrastructure. The study concludes that durable reform requires aligning incentives across the project lifecycle, strengthening institutional capacity, and recognizing the endogenous nature of opportunism within public procurement systems.

Keywords: Public procurement, road construction, cost escalation, incentive theory, inflation risk, contract renegotiation

Introduction

Public road infrastructure plays a foundational role in economic development, territorial integration, and social inclusion. Governments across the world allocate substantial portions of their capital budgets to the construction, expansion, and maintenance of road networks. Despite advances in engineering, project management, and procurement regulation, road construction projects remain disproportionately vulnerable to cost overruns, schedule delays, and post-award contractual disputes. This persistent underperformance has attracted sustained attention from scholars in economics, public policy, and construction management, who have sought to understand not only how these failures occur, but why they recur across institutional contexts and time periods.

Early construction management literature approached cost escalation primarily as a technical or managerial problem, emphasizing forecasting errors, inadequate planning, and poor site management. Studies such as Knight and Fayak highlighted the multiplicity of project-specific factors affecting cost escalation, including design changes, labor productivity, and material price volatility (Knight and Fayak, 2000). Subsequent empirical investigations expanded this perspective by incorporating risk assessment and uncertainty in large infrastructure projects, particularly in contexts characterized by macroeconomic instability, as demonstrated in Japanese civil engineering projects analyzed by Dawood and colleagues (Dawood et al., 2001).

However, as research accumulated, it became increasingly clear that technical explanations alone were insufficient. Comparative and international studies of contractor performance revealed that similar cost and time overruns occurred even in technically advanced environments, suggesting deeper structural causes (Hong and Proverbs, 2003). Flyvbjerg's influential work reframed the debate by arguing that cost overruns in transport infrastructure are often the result of systematic optimism bias and strategic misrepresentation, rather than random error or incompetence (Flyvbjerg, 2004). This shift marked an important turning point by linking construction outcomes to incentives, information asymmetries, and political pressures.

Parallel to developments in construction management, economic theories of procurement and regulation provided powerful analytical tools to interpret these phenomena. The seminal work of Laffont and Tirole established that procurement contracts are inherently incomplete due to uncertainty and asymmetric information, creating scope for moral hazard, adverse selection, and renegotiation (Laffont and Tirole, 1993). Bajari and Tadelis further demonstrated that the choice between fixed-price and cost-plus contracts reflects a fundamental trade-off between incentive provision and transaction costs, particularly in complex projects such as road construction (Bajari and Tadelis, 2001).

The relevance of these theories to public road construction has been increasingly recognized in recent decades. Dimitri and collaborators emphasized that procurement outcomes cannot be evaluated solely on the basis of lowest price, but must consider broader notions of value for money that encompass quality, lifecycle costs, and risk allocation (Dimitri, 2013; Dimitri et al., 2006). Saussier and Valbonesi highlighted the evolution of public procurement research toward integrating political economy, institutional quality, and contract governance (Saussier and Valbonesi, 2018).

Despite this rich body of literature, significant gaps remain. Much of the economic literature abstracts from sector-specific dynamics such as inflation volatility in construction inputs, while construction management studies often lack a coherent incentive-based

framework. Case-based analyses of road projects, such as Parate's examination of inflation impacts in the TxDOT US 90A project, underscore the material importance of macroeconomic variables but do not fully integrate them into a broader theory of procurement behavior (Parate, 2017). Moreover, recent empirical research on court efficiency, political contestability, and renegotiation behavior suggests that institutional environments fundamentally shape procurement performance (Coviello et al., 2018; Beuve et al., 2023).

This article addresses these gaps by developing a comprehensive, theory-driven synthesis of public road construction procurement, with particular emphasis on inflation, incentives, and opportunism. Rather than treating cost escalation and delays as isolated outcomes, the study conceptualizes them as endogenous responses to contractual structures, risk allocation mechanisms, and institutional constraints. By drawing strictly on the provided references, the article integrates insights from economics and construction management to offer a unified explanation of persistent inefficiencies in road procurement.

The remainder of the article proceeds by elaborating a detailed methodological approach grounded in qualitative synthesis and theoretical integration, followed by a descriptive presentation of findings derived from the literature. A deep discussion then interprets these findings in light of competing theoretical perspectives, institutional limitations, and policy implications, before concluding with reflections on future research and reform directions.

Methodology

The methodological approach adopted in this study is grounded in qualitative analytical synthesis rather than empirical estimation or mathematical modeling. This choice reflects both the nature of the research question and the constraints imposed by the available sources. The objective is not to generate new numerical estimates of cost overruns or delays, but to construct an integrated explanatory framework that accounts for the recurring patterns observed in public road construction procurement across diverse contexts.

The study relies exclusively on the provided body of literature, which spans several interrelated domains: construction management studies on cost escalation and contractor performance; economic theories of procurement and incentives; political economy analyses of public contracting; and case-based examinations of infrastructure projects. Each source contributes a distinct analytical lens, and the methodology consists of systematically extracting, comparing, and synthesizing these perspectives.

A first methodological step involves thematic categorization. The references are grouped into conceptual clusters, including inflation and cost escalation, incentive and contract theory, procurement governance and renegotiation, and institutional performance. For example, Parate's case study of inflation impacts is analyzed alongside broader discussions of cost escalation by Knight and Fayak and Flyvbjerg to identify both project-specific and systemic drivers. Similarly, incentive-based models developed by Laffont and Tirole and Bajari and Tadelis are juxtaposed with empirical findings on time overruns and opportunistic behavior in procurement contracts (D'Alpaos et al., 2013; Lewis and Bajari, 2011).

The second step consists of interpretive integration. Rather than treating each study as an isolated contribution, the methodology emphasizes how insights from one domain inform and enrich another. For instance, transaction cost economics provides a theoretical rationale for why complex road projects are prone to renegotiation, while construction management evidence illustrates how these renegotiations manifest as cost overruns and delays. Political economy studies of court efficiency and political contestability are incorporated to explain variation in outcomes across institutional environments (Coviello et al., 2018; Beuve et al., 2023).

The third step involves critical elaboration. Each major claim derived from the literature is examined in depth, considering alternative explanations, counter-arguments, and limitations. This process is essential for achieving theoretical rigor and avoiding simplistic causal narratives. For example, while opportunistic behavior by contractors is often cited as a cause of cost overruns, the analysis also considers how poorly designed contracts and rigid procurement rules may induce such behavior as a rational response to risk and uncertainty.

Throughout the methodology, emphasis is placed on maintaining conceptual coherence and analytical transparency. No numerical data, formulas, or visual representations are introduced; instead, all

relationships are explained through detailed descriptive reasoning. This approach aligns with the objective of producing a publication-ready theoretical article that bridges disciplines and advances understanding of public road construction procurement.

Results

The synthesis of the literature yields several interrelated findings that collectively explain the persistence of cost escalation, delays, and inefficiencies in public road construction procurement. These findings are presented descriptively, emphasizing patterns and mechanisms rather than quantitative magnitudes.

A central finding is that inflation plays a critical but often underestimated role in shaping procurement outcomes. Construction projects, particularly roads, are highly sensitive to price fluctuations in materials, labor, and energy. Parate's analysis of the US 90A project demonstrates how unanticipated inflation can erode contractor margins under fixed-price contracts, creating strong incentives to seek renegotiation or reduce quality (Parate, 2017). This dynamic is not unique to a single jurisdiction; it reflects a structural vulnerability of long-duration infrastructure projects to macroeconomic uncertainty.

Another key finding concerns the trade-off between incentive strength and contractual flexibility. Fixed-price contracts, commonly used in road procurement to control costs, provide strong incentives for efficiency but expose contractors to significant risk in the presence of design changes or inflation. Cost-plus contracts, by contrast, offer greater flexibility but weaken cost-control incentives. Bajari and Tadelis show that neither contract type is universally optimal; instead, outcomes depend on project complexity and the cost of renegotiation (Bajari and Tadelis, 2001). In road construction, where uncertainty is pervasive, rigid reliance on fixed-price contracts often leads to ex post adjustments that undermine their intended benefits.

The literature also reveals that time overruns are frequently the result of strategic behavior rather than mere technical delays. D'Alpaos and colleagues provide evidence that contractors may deliberately slow project execution to extract additional rents through renegotiation, particularly when enforcement is weak (D'Alpaos et al., 2013). Lewis and Bajari further demonstrate that the introduction of time incentives can mitigate delays, but only when they are credibly enforced and aligned with contractor capabilities (Lewis and Bajari, 2011).

Institutional quality emerges as a decisive factor influencing procurement performance. Coviello and co-authors find that efficient courts enhance procurement outcomes by deterring opportunistic behavior and reducing the expected gains from litigation or renegotiation (Coviello et al., 2018). Conversely, Beuve and colleagues show that political contestability can either discipline or destabilize procurement, depending on whether political actors respect contractual commitments (Beuve et al., 2023).

Finally, the results underscore that value for money in public road construction cannot be reduced to lowest initial cost. Dimitri argues that procurement systems focused narrowly on price competition often sacrifice quality and long-term efficiency (Dimitri, 2013). Empirical evidence from construction management studies supports this claim, showing that poor contractor performance is often linked to aggressive underbidding and subsequent attempts to recover losses through claims and change orders (Hong and Proverbs, 2003; Enshassi et al., 2009).

Discussion

The findings synthesized in this study have profound implications for how public road construction procurement is understood and governed. At a theoretical level, they reinforce the view that procurement outcomes are the product of strategic interaction under conditions of uncertainty, rather than the mechanical result of technical planning. Cost overruns, delays, and renegotiations should therefore be interpreted as equilibrium outcomes within specific institutional and contractual environments.

One important implication concerns the role of inflation. Traditional procurement models often treat price volatility as an exogenous shock, but the literature suggests that inflation risk is endogenous to contract design. When contracts fail to allocate inflation risk appropriately, they create incentives for opportunistic behavior. Indexation clauses or risk-sharing mechanisms may reduce this problem, but they also introduce new challenges related to monitoring and verification. The absence of such mechanisms in many road contracts reflects institutional inertia rather than economic

rationality.

Another critical issue is the tension between rule-based procurement and relational contracting. Public procurement regulations are often designed to ensure transparency and prevent corruption, leading to highly standardized procedures and limited discretion. While these rules serve important accountability functions, they may exacerbate inefficiencies in complex projects by restricting adaptive responses to unforeseen conditions. The literature on transaction costs suggests that some degree of relational governance is unavoidable in road construction, given the impossibility of fully specifying contracts ex ante (Bajari and Tadelis, 2001; Laffont and Tirole, 1993).

The discussion also highlights the political economy of procurement. Road projects are highly visible and politically salient, making them susceptible to strategic manipulation by both politicians and contractors. Flyvbjerg's argument about strategic misrepresentation resonates strongly with findings on renegotiation and political contestability (Flyvbjerg, 2004; Beuve et al., 2023). This suggests that reforms focused solely on technical capacity building are unlikely to succeed without addressing underlying political incentives.

Limitations of the current synthesis should be acknowledged. By relying strictly on the provided references, the analysis cannot incorporate recent empirical data or alternative methodological approaches such as randomized evaluations. Moreover, the absence of quantitative analysis limits the ability to assess the relative importance of different factors. Nonetheless, the depth and coherence of the theoretical integration provide a robust foundation for future research.

Future studies could build on this framework by empirically testing specific hypotheses about inflation risk allocation, contract choice, and institutional quality in road procurement. Comparative analyses across countries with different legal and political systems would be particularly valuable. Additionally, integrating lifecycle cost analysis with incentive theory could further advance understanding of value for money in infrastructure procurement.

Conclusion

This article has developed a comprehensive theoretical synthesis of public road construction procurement, grounded strictly in established literature from economics and construction management. By integrating insights on inflation, incentives, opportunism, and institutional quality, the study explains why cost overruns and delays persist despite decades of reform. The analysis demonstrates that these outcomes are not aberrations but predictable responses to misaligned incentives, incomplete contracts, and weak governance structures.

The central conclusion is that improving procurement performance in road construction requires more than tighter controls or more sophisticated forecasting. It demands a rethinking of how risk is allocated, how contracts are designed, and how institutions enforce commitments. Recognizing the endogenous nature of opportunism and cost escalation is a critical first step toward more resilient and value-enhancing procurement systems.

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