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Yardstick competition under fiscal and administrative asymmetries: Rent-seeking and local cooperation

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Abstract

This paper develops a two-period model to investigate how fiscal and bureaucratic asymmetries shape yardstick competition (YC), inter-municipal cooperation (IMC), and rent-seeking in local public service provision. Unlike previous approaches, we allow incumbents to invest in bureaucratic efficiency, influencing both service quality and delivery time. Voters observe outputs but not rents, creating electoral incentives that interact with structural disparities. Our analysis shows that these asymmetries distort YC, biasing accountability and altering cooperation incentives. While IMC can reduce service gaps, it may also weaken electoral discipline and facilitate cooperative rent extraction, especially under moderate disparities or high fixed costs. We demonstrate that rent extraction does not always move inversely with service provision: when bureaucratic improvement costs are low, incumbents can deliver higher service quality while extracting larger rents. Numerical illustrations confirm that, in most configurations, incumbents optimally reduce bureaucratic efficiency to create slack for rent extraction. Policy

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implications include the need for performance benchmarks that account for structural conditions, targeted reforms to reduce efficiency gaps, and transparency mechanisms in cooperative arrangements. These findings challenge conventional assumptions linking service quality to governance and highlight the importance of structure-adjusted accountability frameworks.

KEYWORDS

inter-municipal cooperation, fiscal disparities, bureaucratic efficiency, administrative capacity, rent-seeking, yardstick competition

1 | INTRODUCTION

Local governments operate under heterogeneous fiscal and institutional conditions, which influence both the quality and timeliness of public service delivery. Voters typically rely on observable outputs to hold politicians accountable, yet they cannot observe rents or underlying costs, making electoral discipline imperfect. Yardstick competition (YC) is often viewed as a corrective mechanism: by comparing outcomes across jurisdictions, voters infer relative performance. However, when jurisdictions differ in costs or bureaucratic efficiency, these comparisons may be biased, potentially undermining accountability.

The literature has examined the impact of fiscal disparities on political YC (Allers, 2012; Farah, 2019; Kotsogiannis & Schwager, 2008) and explored how such disparities affect incentives for inter-municipal cooperation (IMC) among rent-seeking governments (Di Liddo & Giuranno, 2016, 2024). At the same time, scholars emphasize the role of bureaucracy in shaping service quality and delivery time. Bureaucratic efficiency determines not only the administrative duration of project execution but also citizens' perceived responsiveness of public institutions. Both theoretical models (Ciccone & Papaioannou, 2007) and empirical evidence (Rasul & Rogger, 2018) show that bureaucratic frictions and organizational inefficiencies can generate substantial delays in public service provision. Furthermore, standardized indicators of competence and procedural quality (Decarolis et al., 2020) enable systematic assessment of bureaucratic performance and its contribution to governance effectiveness.

This paper extends the YC framework of Di Liddo and Giuranno (2016) by introducing a new dimension: local administrators can invest in bureaucratic efficiency, thereby influencing both service quality and delivery time. Unlike Di Liddo and Giuranno (2024), where institutional differences were treated as exogenous, our model allows incumbents to mitigate disparities through local investments. Voters observe service quality and timeliness but not rents, creating incentives for incumbents to manipulate efficiency strategically. We analyse how these asymmetries distort YC, shape rent extraction, and influence decisions to cooperate through IMC. Throughout the paper, we use the term “inter-municipal cooperation” to denote the institutional arrangement through which municipalities provide the service jointly. When such cooperation weakens electoral discipline and allows incumbents to appropriate cost savings, we refer to this outcome as cooperative rent extraction.

This paper contributes to the literature on rent-seeking and cooperative behaviour by showing how cost asymmetries affect equilibrium outcomes under alternative institutional arrangements. In particular, we compare non-cooperative and cooperative regimes and show that cost heterogeneity plays a crucial role in shaping effort levels, rent dissipation, and welfare. Unlike existing models that focus either on symmetric agents or on a single institutional setting, our framework highlights how cooperation may amplify or mitigate inefficiencies depending on the underlying cost structure. Our paper differs from the strands of the literature cited above by explicitly comparing cooperative and non-cooperative regimes in the presence of cost asymmetries, thereby providing a unified framework to analyse institutional design and welfare implications.

In particular, the contribution of this paper is twofold. First, we consider the joint role of fiscal and bureaucratic heterogeneity in shaping electoral accountability and cooperation incentives. Second, we show that rent extraction does not always move inversely with service provision: under certain conditions—particularly when bureaucratic improvement costs are low—incumbents can deliver higher service quality while extracting larger rents. We interpret these costs as a reduced-form measure of inherited administrative capacity: where technical staff, procurement expertise, and digital routines are already in place, raising bureaucratic efficiency is less resource-consuming, so higher observed quality need not imply lower rent extraction (Bachtler et al., 2024; Baltrunaite et al., 2025; Frigo & Mocetti, 2025; OECD, 2020). Moreover, cooperation through consortia, while potentially reducing service disparities, can weaken electoral discipline. When fixed costs are high, the incentive to cooperate becomes stronger, but cost savings are often appropriated by incumbents rather than translated into citizen welfare.

Our findings challenge conventional assumptions about the relationship between efficiency, accountability, and cooperation. Specifically, reducing rent-seeking does not necessarily guarantee higher service levels; lowering costs does not always lead to more efficient provision; and mitigating disparities, while reducing rents, may foster cooperation and cooperative rent extraction.

The remainder of the paper is organized as follows. Section 2 reviews the literature on YC, IMC, and bureaucratic efficiency. Section 3 introduces the model and its assumptions. Sections 4–5 analyse the non-cooperative and cooperative equilibria, emphasizing the role of asymmetries. Section 6 extends the model to incorporate fixed costs in the provision of local public goods and services. Section 7 concludes with policy implications and directions for future research.

2 | LITERATURE REVIEW

2.1 | Yardstick competition

The concept of YC was first formalized by Besley and Case (1995) through a political economy model of tax-setting in a multi-jurisdictional context. Subsequent studies have expanded this framework, emphasizing that voters cannot directly observe the costs of public service provision or the rents extracted by local administrators. To overcome these informational asymmetries, voters compare their own jurisdiction's performance with that of others, using observable indicators such as service quality or quantity. This comparison creates a competitive mechanism: incumbents anticipate that voters will benchmark their performance against neighbouring jurisdictions and adjust their behaviour accordingly to maximize rents while maintaining re-election prospects. Although YC does not eliminate informational asymmetry, it mitigates its consequences by disciplining incumbents through relative performance evaluation (Di Liddo & Vinella, 2022, 2024).

Empirical evidence supports the existence of tax-mimicking behaviour among local governments. For instance, Besley and Case (1995) document this phenomenon using US state data from 1960 to 1988. Similarly, Bordignon et al. (2003) find positive spatial autocorrelation in property tax rates among Italian municipalities where mayors seek re-election, but no correlation where term limits apply. More recent evidence from German states and municipalities confirms YC in business tax rate decisions (Buettner & von Schwerin, 2016).

While most studies assume jurisdictions are identical or sufficiently similar, recent research explores how disparities affect YC. Allers (2012) shows that fiscal disparities—differences in revenue capacity or spending needs—bias YC: wealthier jurisdictions can provide high-quality services at low tax rates, enabling incumbents to extract rents while remaining electorally secure. Other theoretical contributions demonstrate that such disparities may be endogenously induced. For example, Di Liddo and Vinella (2022) show that when rent-seeking administrators choose between traditional procurement and public–private partnerships, YC equilibria feature heterogeneous service levels, rents, and re-election probabilities, even among otherwise identical jurisdictions. Laboratory experiments corroborate the existence of YC bias under fiscal asymmetries (Di Liddo & Morone, 2017, 2023).

Institutional disparities also distort YC. Farah (2019) finds that differences in institutional quality—treated as exogenous—affect rent appropriation costs and YC outcomes. When rent extraction is costly for one incumbent, both incumbents reduce rents, increasing accountability in a counterintuitive way. Similarly, Di Liddo and Giuranno (2024) show that improving institutional quality in only a subset of jurisdictions can raise incentives to collude under intermediate fiscal disparities, paradoxically reducing overall accountability.

2.2 | Inter-municipal cooperation

Over the past two decades, IMC has attracted growing attention, particularly in public administration research. IMC is often viewed as an alternative mode of service provision that can exploit economies of scale and reduce costs (Bischoff et al., 2024). Empirical studies document its adoption across diverse services, including waste management, regional development, and tourism marketing (Bergholz, 2018). IMC is especially appealing for small rural municipalities with limited contracting capacity and high private provision costs (Arachi et al., 2016; Bel & Costas, 2006; Bel & Fageda, 2017). Evidence suggests fiscally weak municipalities are more likely to cooperate (Bel et al., 2013; Schoute et al., 2018; Warner & Hefetz, 2002) and outsource services (Bel & Fageda, 2007). Cooperation is also more likely among municipalities with similar characteristics (Di Liddo & Giuranno, 2016, 2024; Feiock et al., 2009).

Beyond fiscal and demographic factors, political considerations influence IMC decisions. Garrone et al. (2013) argue that public managers favour IMC to strengthen managerial autonomy and limit political interference, while survey evidence from German municipalities suggests elected officials perceive IMC as a loss of political power (Bergholz, 2018).

2.3 | The YC–IMC interplay

Public choice literature highlights that IMC can weaken electoral accountability by reducing the effectiveness of YC. When service provision is centralized through consortia, voters lose the ability to benchmark performance across jurisdictions, diminishing competitive pressure on

incumbents. Di Liddo and Giuranno (2016) formalize this mechanism, showing that rent-seeking administrators may strategically adopt IMC to undermine YC and increase rents. This theoretical insight aligns with empirical findings by Bel et al. (2023), who report mixed evidence on cost savings from IMC: while cooperation reduces costs in Spain and the Czech Republic, results are inconclusive or absent in countries such as Germany, Italy, and Norway. These patterns suggest that IMC outcomes depend critically on the underlying incentives shaped by YC.

2.4 | Bureaucracy and service delivery

The relationship between bureaucratic organization and timely service delivery has long been central to political economy and public administration. Classical theories—from Weber's notion of rational-legal authority (Weber, 1978) to Merton's analysis of bureaucratic rigidity (Merton, 1940)—emphasize that rule-based structures, while essential for governance, may generate inefficiencies. Niskanen's model of bureaucratic behaviour (Niskanen, 2017) formalized the idea that self-interested bureaucrats expand budgets and processes, creating “red tape.”

Empirical research confirms that bureaucratic characteristics strongly influence state capacity and service delivery. Rauch and Evans (2000) show that meritocratic recruitment and professionalization improve governance outcomes, while Besley and Persson (2009) identify bureaucratic quality as a pillar of state capacity. More recent studies link managerial practices to delivery performance: Rasul and Rogger (2018) find that monitoring and performance incentives significantly reduce project delays in Nigeria, and Decarolis et al. (2020) show that competent procurement agencies shorten contract execution times.

Parallel research examines administrative burdens on citizens and agencies. Moynihan et al. (2015) conceptualize these burdens as learning, psychological, and compliance costs, which extend service delivery times. Ciccone and Papaioannou (2007) provide macroeconomic evidence that excessive procedures delay resource allocation and reduce welfare. Behavioural studies highlight the role of public service motivation: Francois (2000) argues that altruistic preferences among bureaucrats can mitigate inefficiencies when paired with appropriate incentives. Recent work by Besley et al. (2021) underscores the importance of selection and monitoring in improving bureaucratic productivity.

Building on these insights, the next section extends the analysis of Di Liddo and Giuranno (2016) by introducing a dual source of disparity: (1) differences in the cost of providing local public goods and (2) differences in the cost of improving bureaucratic efficiency. We examine how these asymmetries interact to shape IMC outcomes under rent-seeking behaviour.

3 | THE MODEL

We consider two municipalities, indexed by $i \in \{1, 2\}$, with identical voters and exogenously determined tax revenues. For simplicity, we normalize both population and tax revenues to unity.

Each jurisdiction provides a certain amount or quality of a local public good $q_i > 0$, under constant returns to scale. Following Di Liddo and Giuranno (2016), municipalities differ in their expenditure needs or cost of provision, represented by c_i . Administrators know the extent of this fiscal disparity, whereas voters do not. Without loss of generality, we assume that municipality 1 faces higher fiscal costs. Specifically, we normalize $c_1 = 1$ and set $c_2 = c \in (0, 1]$.

3.1 | Bureaucratic efficiency and administrative costs

In addition to fiscal disparities, local administrators can influence bureaucratic efficiency, captured by the parameter ϵ_i . Positive values of ϵ_i represent efficiency-enhancing interventions, for example, through training, digitalization, or process streamlining, while negative values reflect deliberate inefficiencies such as strategic delays or excessive procedural requirements. Both municipalities start with an initial efficiency level normalized to 1 and the local bureaucratic efficiency levels must be positive, that is $1 + \epsilon_i > 0$. The cost of improving bureaucratic efficiency differs across jurisdictions and is denoted by $\gamma_i \in (0, 1]$. Investments in efficiency accelerate service delivery and increase citizens' welfare, but they also reduce the resources available for rent extraction.

3.2 | Administrative capacity and bureaucratic improvement costs

The parameter γ_i can be interpreted as the marginal cost of bureaucratic improvement. This cost is likely to be lower when incumbents inherit stable technical offices, experienced procurement staff, digital routines, standardized administrative procedures, and previous experience in managing public investment programs. Conversely, γ_i is likely to be higher where municipalities face staff shortages, high turnover, weak technical capacity, fragmented procedures, or legacy administrative systems. These conditions are not country-specific. They arise across fragmented systems of local government, especially where municipalities differ in their ability to manage procurement, absorb external funds, and implement investment projects. Italy provides a useful illustration rather than a special case, since recent evidence documents substantial heterogeneity in municipal administrative quality, a relationship between administrative capacity and the speed of local public spending, and complementarities between human capital, digitalization, and procurement performance (Bachtler et al., 2024; Baltrunaite et al., 2025; Cerqua et al., 2025; Del Monte et al., 2025; Frigo & Mocetti, 2025; OECD, 2020). In terms of the model, a low γ_i means that increasing bureaucratic efficiency ϵ_i is relatively inexpensive. Hence, an incumbent can raise the observed service level $S_i = q_i(1 + \epsilon_i)$ without substantially reducing the resources available for rent extraction. This is the mechanism behind the paper's prediction that higher observed service quality and higher rents may coexist.

Incumbents may choose between providing services independently or jointly through a consortium. Examples include the Italian *Unioni di Comuni* (Arachi et al., 2016; Di Liddo & Giuranno, 2020; Luca & Modrego, 2021), as well as similar arrangements in other countries (e.g., Zweckverbände in Germany, Mancomunidades in Spain).

We assume a two-period electoral cycle, consistent with systems where incumbents can serve a maximum of two mandates. In each period $t \in \{1, 2\}$, the incumbent in jurisdiction i extracts a rent R_i^t given by:

$$R_i^t = 1 - c_i q_i^t - \gamma_i \epsilon_i^t, \quad (1)$$

where 1 represents normalized tax revenue, c_i captures fiscal costs, and γ_i captures the cost of efficiency improvements.

3.3 | Minimum standards and electoral information

Following Di Liddo and Giuranno (2016, 2024), we impose minimum standards for both service quality and timeliness. Judicial authorities observe c_i and γ_i and compute conditional standards, as in the Italian system of “standard expenditure needs.” Let $\theta \in (0, 1)$ and $\xi \in (-1, 1)$ denote the minimum standards respectively for quality and efficiency level, such that $q_{i,\min} = \frac{\theta}{c_i}$ and $\epsilon_{i,\min} = \frac{\xi}{\gamma_i}$. Thus, the minimum service level guaranteed by each incumbent is:

$$S_{i,\min} = \frac{\theta}{c_i} \left(1 + \frac{\xi}{\gamma_i} \right). \quad (2)$$

This formulation ensures that judicial oversight incorporates both fiscal and administrative disparities, setting conditional minimum standards that reflect structural differences across jurisdictions. The minimum level of the total service provided by the two local jurisdictions $S_{i,\min}$ has to be positive and expenditures incurred by local administrators must respect the budget constraints described in (1). Therefore, to ensure feasibility, we impose $\xi > -\gamma_i$ and $\theta + \xi < 1$.

We interpret the minimum standard as a minimum spending (or effort) requirement imposed by the regulator, rather than as a minimum level of observable service provision. In the presence of jurisdiction-specific cost heterogeneity, a uniform spending requirement does not generally translate into a uniform service outcome: the same level of mandated effort may result in different observable service levels across jurisdictions. This interpretation is consistent with models in which minimum standards are defined in terms of expenditure needs or effort, while voters evaluate incumbents on the basis of observable outcomes, as in the YC and IMC literature (Di Liddo & Giuranno, 2016, 2024).

Voters cannot observe rents R_i^t but can observe the effective service level:

$$S_i^t = q_i^t (1 + \epsilon_i^t), \quad (3)$$

where the term $(1 + \epsilon_i^t)$ reflects bureaucratic efficiency adjustments.

Re-election probabilities follow a standard contest success function (Tullock, 2008):

$$P_i(S_i^1, S_j^1) = \frac{S_i^1}{S_i^1 + S_j^1}, \quad i, j \in \{1, 2\}, i \neq j. \quad (4)$$

where S_i^1 and S_j^1 are observed service levels in the first period. If $S_i^1 = S_j^1$, then $P_i = P_j = 1/2$; if $S_i^1 > S_j^1$, then $P_i > P_j$. The function satisfies $\partial P_i / \partial S_i^1 \geq 0$, $\partial^2 P_i / \partial (S_i^1)^2 \leq 0$, and $\partial P_i / \partial S_j^1 \leq 0$. Accordingly, electoral competition operates on observable service provision, while the regulatory constraint applies to spending effort (minimum standards), which remains unobservable to voters.

Both incumbents value re-election and share a common discount factor $\delta \in [0, 1]$. In the first period, both are in their initial mandate.

3.4 | Timing of the game

At the beginning of the electoral term, incumbents inherit a pre-existing municipal cost structure. The fiscal cost of service provision, c_i , and the marginal cost of bureaucratic improvement, γ_i , are therefore treated as predetermined state variables reflecting administrative and fiscal conditions accumulated before the current mandate. These conditions include technical staff, procurement expertise, digital routines, organizational procedures, and previous experience in managing public investment programs. Incumbents observe c_i and γ_i , whereas voters observe neither these structural costs nor rents.

In the first period, each incumbent decides whether to provide the public good independently or to enter into cooperation with the other incumbent. If both incumbents agree to cooperate, the service is provided jointly through an inter-municipal consortium. Under the non-cooperative regime, each incumbent independently chooses the service quantity, q_i , and the bureaucratic effort, ϵ_i , to be exerted in the first period. Voters observe only the resulting service level, $S_i = q_i(1 + \epsilon_i)$, which determines re-election probabilities through the YC contest function. If incumbents form an inter-municipal consortium, they instead choose common parameters, q and ϵ . In the second period, re-elected incumbents cannot run again and therefore choose the minimum levels required by the regulatory constraint. We then compare the non-cooperative benchmark with the cooperative regime.

These assumptions are consistent with public and cooperative organizations in which participants differ in efficiency, information, or access to resources. Cost asymmetries may reflect differences in managerial ability, political influence, or organizational capacity, which are commonly observed in real-world institutional settings.

The following sections first characterize the non-cooperative benchmark and then examine how IMC changes rent-sharing and accountability incentives.

4 | NON-COOPERATIVE EQUILIBRIUM

We characterize the decentralized non-cooperative Nash equilibrium, where each incumbent chooses service quantity and bureaucratic efficiency to maximize expected rents over two mandates.

The non-cooperative benchmark can be summarized directly from the timing of the game. In the second mandate, incumbents cannot be re-elected and thus provide only the minimum required service and efficiency levels: θ/c_i and ξ/γ_i . Consequently, rent in the second mandate equals $1 - \sigma$, where $\sigma = \theta + \xi$. For simplicity, denote $q_i^1 \equiv q_i$, $\epsilon_i^1 \equiv \epsilon_i$ and $S_i^1 \equiv S_i$.

In the first mandate, incumbent i solves:

$$\max_{q_i, \epsilon_i} \left[(1 - c_i q_i - \gamma_i \epsilon_i) + \frac{q_i(1 + \epsilon_i)}{q_i(1 + \epsilon_i) + q_j(1 + \epsilon_j)} \delta(1 - \sigma) \right], \quad (5)$$

where $i, j \in \{1, 2\}$ and $i \neq j$.

The first-order conditions are reported in Appendix A.

Solving the first-period problem yields the equilibrium quantities and bureaucratic-efficiency choices reported in Proposition 1.

Proposition 1 (non-cooperative Nash equilibrium). *An interior critical point $(q_1^*, q_2^*, \epsilon_1^*, \epsilon_2^*)$ exists and is given by:*

$$q_1^* = \frac{c(1-\sigma)\gamma_1\gamma_2\delta}{(c\gamma_2 + \gamma_1)^2}, \quad (6)$$

$$q_2^* = \frac{(1-\sigma)\gamma_1\gamma_2\delta}{(c\gamma_2 + \gamma_1)^2}, \quad (7)$$

$$\epsilon_1^* = -\frac{c^2\gamma_2^2 + c\delta\sigma\gamma_2 - c\delta\gamma_2 + 2c\gamma_1\gamma_2 + \gamma_1^2}{c^2\gamma_2^2 + 2c\gamma_1\gamma_2 + \gamma_1^2}, \quad (8)$$

$$\epsilon_2^* = -\frac{c^2\gamma_2^2 + c\delta\sigma\gamma_1 - c\delta\gamma_1 + 2c\gamma_1\gamma_2 + \gamma_1^2}{c^2\gamma_2^2 + 2c\gamma_1\gamma_2 + \gamma_1^2}. \quad (9)$$

Moreover, if the following inequalities hold:

$$3\gamma_1 > c\gamma_2 \quad \text{and} \quad 3c\gamma_2 > \gamma_1, \quad (10)$$

then $(q_1^*, q_2^*, \epsilon_1^*, \epsilon_2^*)$ is a local Nash equilibrium in interior strategies. In that case, each incumbent's best response is locally unique at the equilibrium point.

The derivation and the second-order conditions are reported in Appendix A.

Remark. If (10) fails, the interior critical point obtained from the first-order conditions is not guaranteed to be a maximum for at least one incumbent (it may be a saddle point). In that case, the Nash equilibrium (if it exists) involves boundary choices and must be determined by explicitly considering the admissible strategy set and checking corner solutions.¹ In our analysis we are not interested in corner solutions and we consider only the unique interior Nash equilibrium point described by (6)–(9). This equilibrium shows that service levels depend on fiscal and administrative cost asymmetries, while efficiency choices are influenced by both disparities and electoral incentives. Interestingly, incumbents may choose negative efficiency (delays) when the marginal cost of improvement is high relative to electoral benefits. In particular, higher-cost incumbents optimally scale down effort relative to lower-cost incumbents, so heterogeneity shifts rent-seeking activity toward the more efficient jurisdictions.

The same equilibrium delivers the observable-service, re-election, and rent outcomes collected below.

¹ Under the maintained restriction on ϵ_i , the optimal choice of service provision is strictly interior, so that corner solutions are ruled out. For extreme values of ϵ_i , corner solutions may arise. These cases are ruled out by assumption, as they are not central to the mechanisms studied in the paper.

Proposition 2 (observable service and re-election). Let $S_i^* = q_i^*(1 + \epsilon_i^*)$ denote the observable service. Then

$$S_1^* = \frac{c^2\gamma_1\gamma_2^2\delta^2(1-\sigma)^2}{(c\gamma_2 + \gamma_1)^4}, \quad S_2^* = \frac{c\gamma_1^2\gamma_2\delta^2(1-\sigma)^2}{(c\gamma_2 + \gamma_1)^4}. \quad (11)$$

The re-election probabilities are:

$$P_1^* = \frac{c\gamma_2}{c\gamma_2 + \gamma_1}, \quad P_2^* = \frac{\gamma_1}{c\gamma_2 + \gamma_1}. \quad (12)$$

Proof. Substitute (q_i^*, ϵ_i^*) from Proposition 1 into $S_i^* = q_i^*(1 + \epsilon_i^*)$ and simplify to obtain the stated closed forms. For P_i^* , use $P_i^* = \frac{S_i^*}{S_1^* + S_2^*}$ and cancel common factors. $\square$

Proposition 3 (Rents). First-period rents at the non-cooperative equilibrium are:

$$R_1^{1*} = \frac{\gamma_1^3 + (2c\gamma_2 + 1)\gamma_1^2 + [(c\gamma_2 + 2) + (2\sigma - 2)\delta]c\gamma_2\gamma_1 + c^2\gamma_2^2}{(c\gamma_2 + \gamma_1)^2}, \quad (13)$$

$$R_2^{1*} = \frac{c^2\gamma_2^3 + c(c + 2\gamma_1)\gamma_2^2 + 2\left[\frac{1}{2}\gamma_1 + c - c(1 - \sigma)\delta\right]\gamma_1\gamma_2 + \gamma_1^2}{(c\gamma_2 + \gamma_1)^2}. \quad (14)$$

Expected rents over two periods are:

$$R_1^* = \frac{[1 + \gamma_1 + (1 - \sigma)\delta]c^2\gamma_2^2 + \gamma_1c[2\gamma_1 + 2 - (1 - \sigma)\delta]\gamma_2 + \gamma_1^2(1 + \gamma_1)}{(c\gamma_2 + \gamma_1)^2}, \quad (15)$$

$$R_2^* = \frac{[1 + \gamma_2 + (1 - \sigma)\delta]\gamma_1^2 + [2\gamma_2 + 2 - (1 - \sigma)\delta]c\gamma_2\gamma_1 + c^2\gamma_2^2(\gamma_2 + 1)}{(c\gamma_2 + \gamma_1)^2}. \quad (16)$$

Proof. Plug (q_i^*, ϵ_i^*) into $R_i^1 = 1 - c_i q_i^* - \gamma_i \epsilon_i^*$ to obtain (13)–(14). Expected rents follow from $R_i^* = R_i^{1*} + P_i^* \delta(1 - \sigma)$. $\square$

Interpretation. The fiscally disadvantaged jurisdiction supplies less quantity ($q_1^* = cq_2^*$), but observable service and re-election probabilities depend on both fiscal and administrative asymmetries. Because voters benchmark outcomes without seeing costs, YC tends to favour structurally advantaged incumbents. From $R_1^{1*} - R_2^{1*} = \gamma_1 - \gamma_2$, we note that, interestingly, in the first period, $R_1^{1*} > R_2^{1*}$ iff $\gamma_1 > \gamma_2$. This means that the incumbent belonging to the jurisdiction with higher improvement costs secures larger rents in the initial period.

Proposition 4. We get $R_1^* > R_2^*$ if

$$\begin{cases} \delta > \delta^C & \text{if } \gamma_1 < c\gamma_2 \\ \delta < \delta^C & \text{if } \gamma_1 > c\gamma_2 \end{cases} \quad (17)$$

TABLE 1 Comparative statics: Signs of partial derivatives.

Outcome	$\partial/\partial c$	$\partial/\partial \gamma_1$	$\partial/\partial \gamma_2$
S_1^*	$\begin{cases} + & \text{if } \gamma_1 > c\gamma_2 \\ - & \text{otherwise} \end{cases}$	—	$\begin{cases} + & \text{if } \gamma_1 > c\gamma_2 \\ - & \text{otherwise} \end{cases}$
S_2^*	—	$\begin{cases} + & \text{if } c\gamma_2 > \gamma_1 \\ - & \text{otherwise} \end{cases}$	—
P_1^*	+	—	+
P_2^*	—	+	—
R_i^{1*}	Ambiguous	Ambiguous	Ambiguous
R_i^*	Ambiguous	Ambiguous	Ambiguous

when

$$\delta^C = \frac{(\gamma_2 - \gamma_1)(c\gamma_2 + \gamma_1)}{(1 - \sigma)(c\gamma_2 - \gamma_1)}. \quad (18)$$

Proof. From

$$R_1^* - R_2^* = \frac{\gamma_1^2 + [(c - 1)\gamma_2 - (1 - \sigma)\delta]\gamma_1 - [\gamma_2 - (1 - \sigma)\delta]c\gamma_2}{c\gamma_2 + \gamma_1}, \quad (19)$$

we obtain that setting $\delta = \delta^C$, it follows $R_1^* - R_2^* = 0$. The thesis follows computing $\frac{\partial(R_1^* - R_2^*)}{\partial \delta}$. $\square$

This result provides a counterintuitive insight: the administration facing higher costs does not always tend to extract less rent over the two periods.

4.1 | Comparative statics

Table 1 summarizes the comparative statics of the non-cooperative equilibrium. The full derivative calculations are reported in Appendix B. The results highlight how fiscal and administrative asymmetries shape equilibrium incentives. First, observable service provision declines when the fiscal or bureaucratic cost directly affecting the jurisdiction increases. Cross-cost effects, instead, depend on whether the variation widens or narrows the cost gap between jurisdictions: when asymmetries become larger, service provision tends to fall in the affected jurisdiction; when costs become more similar, service provision tends to improve.

Second, re-election probabilities move systematically with relative costs. An increase in the fiscal or bureaucratic cost borne by an incumbent reduces that incumbent's re-election probability, while an increase in the corresponding cost faced by the other jurisdiction raises it. Thus, the administrator facing lower effective costs is more likely to be re-elected. Finally, the implications for rent extraction are less mechanical. First-period rents tend to move in the opposite direction to service provision with respect to cost variations affecting the comparator jurisdiction. More generally, both first-period and expected rents may increase or decrease depending on whether the relevant cost change affects the incumbent's own jurisdiction or the neighbouring jurisdiction. This explains why the rent effects are classified as ambiguous in Table 1.

TABLE 2 Yardstick competition (YC) bias and threshold configuration across regimes.

Regime	YC status	Rent vs. re-election	Thresholds (sign/order)
Case 1: $\gamma_1 < c\gamma_2 < \gamma_2$	Partially effective	$R_1^{1*} < R_2^{1*}, P_1^* > P_2^*$	$\delta_{11} > 0, \delta_{21} < 0, 0 < \delta_1 < \delta_2, \delta^C > 0$
Case 2: $c\gamma_2 < \gamma_1 < \gamma_2$	Biased	$R_1^{1*} < R_2^{1*}, P_1^* < P_2^*$	$\delta_{11} < 0, \delta_{21} > 0, 0 < \delta_2 < \delta_1, \delta^C < 0$
Case 3: $c\gamma_2 < \gamma_2 < \gamma_1$	Partially effective	$R_1^{1*} > R_2^{1*}, P_1^* < P_2^*$	$\delta_{11} < 0, \delta_{21} > 0, 0 < \delta_2 < \delta_1, \delta^C > 0$

4.2 | YC bias and threshold effects in rent extraction

We now explore how fiscal and bureaucratic asymmetries distort YC and shape rent-seeking incentives at the non-cooperative equilibrium. Building on the comparative statics, we focus on *threshold conditions* that determine whether YC is *partially effective* (high-rent incumbents face lower re-election odds) or *biased* (high-rent incumbents also enjoy higher re-election odds).

We refer to the following discount-factor thresholds:

1. δ_{11} : the value of δ at which $\frac{\partial R_1^{1*}}{\partial \gamma_1}$ changes sign (see (B12)).
2. δ_{21} : the value of δ at which $\frac{\partial R_2^{1*}}{\partial \gamma_2}$ changes sign (see (B16)).
3. δ_1, δ_2 : turning points in the signs of the derivatives of expected rents $\frac{\partial R_i^*}{\partial \cdot}$ (see (B20) and (B24)).
4. δ^C : the cross-over threshold for expected rents, i.e., $R_1^* \geq R_2^*$ iff $\delta \leq \delta^C$ (see (18)).

These cut-offs summarize the interaction between fiscal disadvantage (c), administrative cost parameters (γ_1, γ_2), and intertemporal incentives (δ) in determining rent extraction and electoral advantage.

Table 2 shows that YC is *partially effective* when the incumbent extracting higher rent has *lower* re-election probability (R_i^{1*} and P_i^* move in opposite directions across jurisdictions). YC is *biased* when rent and re-election probability move in the *same* direction (R_i^{1*} and P_i^* are both larger for the same incumbent). The thresholds δ_{11}, δ_{21} locate where own-cost effects on first-period rents flip sign; δ_1, δ_2 shape how expected rents respond to cost changes; δ^C marks the rent dominance reversal between jurisdictions.

Following Allers (2012), YC is biased whenever reaction functions do not have identical slopes across jurisdictions, contrary to the benchmark of Besley and Case (1995). In our setting, slopes depend on relative costs: the re-election odds satisfy

$$P_1^* \geq P_2^* \iff c\gamma_2 \geq \gamma_1,$$

and first-period rents satisfy (see Proposition 3)

$$R_1^{1*} \geq R_2^{1*} \iff \gamma_1 \geq \gamma_2.$$

Hence parameter regions determined by the ordering of $\gamma_1, c\gamma_2$, and γ_2 govern the direction and magnitude of yardstick bias.

The detailed derivative signs and the full low-, intermediate-, and high-discounting configurations for the three cases are reported in Appendix B. In the main text, the key implication is that fiscal and administrative asymmetries can either discipline or bias YC depending on whether they move electoral advantage and rent extraction in the same direction.

The threshold analysis has three broader implications. Our analysis confirms that YC is systematically biased by local expenditure disparities, as incumbents' reaction functions exhibit different slopes (Allers, 2012). This bias arises because voters benchmark observable outcomes without accounting for structural cost differences. However, when disparities in bureaucratic improvement costs partially offset fiscal asymmetries, the bias is mitigated, restoring some degree of comparability across jurisdictions.

Threshold conditions ((B20) and (B24)) reveal an important mechanism: under certain parameter configurations, increasing the costs faced by the fiscally disadvantaged administration raises first-period rent extraction in both jurisdictions, while increasing the costs of the fiscally advantaged administration also raises expected rents. In these cases, larger structural disparities are paradoxically associated with lower overall rent-seeking, as incumbents adjust strategies to maintain electoral viability.

The numerical illustrations reported in Appendix C provide additional insight into the non-cooperative equilibrium. The purpose of the numerical examples is to illustrate the analytical results derived in the previous sections. In particular, they show how variations in cost asymmetry affect equilibrium efforts, rent dissipation, and welfare. They show that, across most of the parameter space, equilibrium bureaucratic effort is negative ($\epsilon_i^* < 0$), indicating that incumbents often have incentives to deliberately worsen administrative performance—delaying service provision to create slack for rent extraction. Positive bureaucratic effort ($\epsilon_i^* > 0$) emerges only when improvement costs are very low, making accelerated procedures privately optimal.

Simulations also highlight strong sensitivity to cross-jurisdictional cost variations. When the fiscally disadvantaged jurisdiction faces relatively low bureaucratic improvement costs (γ_1 small), even minor changes in the other jurisdiction's fiscal and administrative costs (c and γ_2) trigger sharp adjustments in rent extraction and service levels. This underscores the strategic interdependence of local administrations under asymmetric conditions.

In summary, structural disparities distort accountability and create incentives for inefficient behaviour. These findings reinforce the need for performance benchmarks that adjust for fiscal and administrative heterogeneity, as well as transparency measures to prevent incumbents from exploiting bureaucratic slack.

The non-cooperative equilibrium provides a useful benchmark to assess how individual incentives shape rent-seeking behaviour in the presence of cost asymmetries. We now turn to the cooperative regime to investigate how coordination among agents modifies these incentives and whether cooperation alleviates or exacerbates inefficiencies. The next section examines how these distortions interact with centralized, cooperative service provision and the decision to engage in IMC.

5 | RENT-SEEKING UNDER COOPERATION

We now analyse rent extraction when incumbents can voluntarily cooperate by forming an inter-municipal consortium. In what follows, IMC denotes the institutional arrangement through which municipalities provide the service jointly. Cooperative rent extraction denotes the possible pathological outcome in which this arrangement weakens electoral discipline and allows incumbents to appropriate the resulting cost savings. Cooperation entails two key decisions: (1) the uniform service quality S jointly provided, and (2) the distribution of the total rent between incumbents. The rent share $p \in [0, 1]$ denotes the fraction allocated to incumbent 1, while $(1 - p)$ goes to incumbent 2. Both S and p result from a Nash bargaining process between the two incumbents.

5.1 | Cooperation and rent sharing

Incumbents cannot commit to future provision because re-election is uncertain. Thus, bargaining occurs separately in each mandate. In the second (final) mandate, re-elected incumbents maximize rents by setting the minimum service standard, regardless of cooperation. Consequently, cooperation in the second period is unstable: incumbents are indifferent between cooperating and acting independently. Following Di Liddo and Giuranno (2024), in the first mandate the consortium also sets the minimum feasible service quality and bureaucratic effort,

$$q^* = q_{\min}, \quad \epsilon^* = \epsilon_{\min},$$

since both incumbents share the objective of maximizing total rent. There is no conflict of interest over service quality because higher quality reduces the rent pool.

The expected total rent extracted by the consortium over two periods is:

$$R^* = 2 \left[(1 - \sigma) + \frac{1}{2} \delta (1 - \sigma) \right] = (2 + \delta)(1 - \sigma). \quad (20)$$

The agreement payoffs for incumbents are:

$$\omega_1(p) = p R^*, \quad \omega_2(p) = (1 - p) R^*, \quad (21)$$

with disagreement payoffs given by the non-cooperative expected rents R_1^* and R_2^* . The bargaining problem is:

$$p^* = \arg \max_{p \in [0,1]} [(\omega_1(p) - R_1^*)(\omega_2(p) - R_2^*)], \quad (22)$$

subject to $\omega_i(p) - R_i^* \geq 0$ for $i = 1, 2$.

Proposition 5. *The solution of the Nash bargaining problem in (22) is*

$$p^* = \frac{1}{2} + \frac{\gamma_1^2 - [(1 - c)\gamma_2 + (1 - \sigma)\delta]\gamma_1 - c\gamma_2[\gamma_2 - (1 - \sigma)\delta]}{2(c\gamma_2 + \gamma_1)(\delta + 2)(1 - \sigma)}. \quad (23)$$

The derivation is reported in Appendix B. When jurisdictions are symmetric ($c = 1, \gamma_1 = \gamma_2$), (23) gives $p^* = 1/2$: rents are split equally. Under asymmetries, yardstick bias translates into an uneven rent share, favouring the fiscally or administratively advantaged incumbent.

5.2 | Cooperative rent extraction

Cooperative rent extraction occurs only if both incumbents gain from cooperation:

$$\omega_i(p^*) - R_i^* > 0, \quad i = 1, 2. \quad (24)$$

Proposition 6. *Cooperation is profitable for both incumbents if and only if*

$$\delta > \bar{\delta} = \frac{1}{4} \frac{(2\sigma + \gamma_1 + \gamma_2)(c\gamma_2 + \gamma_1)^2}{(1 - \sigma)c\gamma_1\gamma_2}. \quad (25)$$

The proof and the comparative statics of this threshold are reported in Appendix B. The threshold $\bar{\delta}$ measures how strongly future rents must be valued for cooperative rent extraction to be profitable. Higher δ makes cooperation more attractive, whereas a higher $\bar{\delta}$ makes it harder to sustain. The key economic implication is that cooperation is most problematic when it combines cost sharing with a reduction in yardstick pressure: in that case, the institutional arrangement may reduce service disparities while weakening electoral accountability.

When disparities are moderate, the relationship between bureaucratic costs and accountability is non-monotonic. However, higher minimum standards and greater fiscal disadvantage generally reduce cooperative rent-extraction incentives, reinforcing electoral discipline. This is why IMC should be assessed not only in terms of cost savings, but also in terms of its consequences for transparency and voter benchmarking.

6 | AN EXTENSION: THE CASE OF FIXED COSTS

We now extend the analysis to consider fixed costs in public service provision and their impact on cooperative outcomes. Fixed costs can significantly alter strategic incentives, particularly the conditions under which incumbents choose IMC.

Under cooperation, fixed costs are incurred only once and shared across jurisdictions, unlike the non-cooperative scenario where each administration bears the cost independently. Typical examples include shared administrative platforms, joint procurement offices, or common infrastructure whose fixed cost can be spread across municipalities. Cost sharing reduces the marginal cost of cooperative rent extraction and weakens electoral discipline, making cooperation more attractive.

Assume both incumbents face the same fixed cost k , paid only in the first period. The rent function becomes:

$$R_i = 1 - k - c_i q_i - \gamma_i \epsilon_i + \delta P_i (1 - \sigma). \quad (26)$$

Since k enters additively, it does not affect non-cooperative equilibrium allocations or comparative statics. Its effect emerges in cooperative provision: incumbents can extract an additional rent equal to k because the cost is paid only once.

6.1 | Fixed costs and cooperative bargaining

Repeating the analysis of Section 5 with the rent function in (26), we obtain the Nash bargaining solution for rent sharing:

$$p_{\text{fix}}^* = \frac{1}{2} + \frac{\gamma_1^2 - [(1 - c)\gamma_2 + (1 - \sigma)\delta]\gamma_1 - c\gamma_2[\gamma_2 - (1 - \sigma)\delta]}{2(c\gamma_2 + \gamma_1)[(\delta + 2)(1 - \sigma) - k]}. \quad (27)$$

Fixed costs also modify the cooperative rent-extraction threshold:

$$\bar{\delta}_{\text{fix}} = \frac{1}{4} \frac{(2\sigma + \gamma_1 + \gamma_2 - k)(c\gamma_2 + \gamma_1)^2}{(1 - \sigma)c\gamma_1\gamma_2}. \quad (28)$$

A higher k lowers $\bar{\delta}_{\text{fix}}$, making cooperative rent extraction easier and weakening accountability. The full derivative calculations and threshold regimes are reported in Appendix B.

Fixed costs amplify incentives for cooperation, especially when cost sharing yields large savings. While higher minimum standards mitigate this effect, large sunk costs can override accountability mechanisms. Cooperative arrangements involving substantial fixed costs should therefore be accompanied by stronger transparency and monitoring, so that cost savings are not simply converted into incumbent rents.

7 | FINAL REMARKS AND POLICY IMPLICATIONS

By combining analytical results with institutional interpretation, this paper aims to contribute to the understanding of cooperative behaviour in public and collective organizations. We examined how fiscal and bureaucratic disparities shape strategic behaviour in local public service provision under YC and IMC. By introducing efficiency investments into the model, we uncover a complex interplay between accountability and rent-seeking that challenges conventional wisdom. The common assumption that better services imply better governance does not hold in our framework: incumbents can manipulate both service quality and delivery time, exploiting structural asymmetries to maximize rents while maintaining electoral viability.

One of the most striking insights is that rent extraction does not always move inversely with service provision. When bureaucratic improvement costs are low, incumbents may simultaneously deliver higher service quality and extract larger rents. This finding undermines the simplistic view that observable outputs are reliable indicators of good governance and calls for a more nuanced approach to performance evaluation.

Interpreting γ_i as inherited administrative capacity gives this result a direct institutional meaning. Municipalities with stronger technical staff, procurement expertise, digital routines, and experience in managing investment programs can raise observable service quality at lower resource cost; digital procurement reforms provide one concrete example of how these inherited capabilities can condition the gains from bureaucratic innovation. In such settings, high observed service quality may reflect favourable administrative fundamentals rather than lower rent extraction (Bachtler et al., 2024; Baltrunaite et al., 2025; Cerqua et al., 2025; Del Monte et al., 2025; Frigo & Mocetti, 2025; OECD, 2020).

Our numerical analysis reinforces these theoretical results. In most realistic configurations, incumbents are incentivized to reduce bureaucratic efficiency, deliberately slowing administrative processes to create slack for rent extraction. Positive efficiency effort emerges only when improvement costs are extremely low, making accelerated procedures privately optimal. Moreover, when the fiscally disadvantaged jurisdiction faces low bureaucratic improvement costs, even small changes in the other jurisdiction's fiscal or administrative parameters trigger sharp adjustments in rents and service levels. These dynamics illustrate the strategic interdependence of local administrations under asymmetric conditions.

Cooperation adds another layer of complexity. While inter-municipal consortia can reduce service disparities, they often weaken electoral discipline. When fixed costs are high, the incentive to

cooperate becomes overwhelming, but the resulting cost savings are frequently appropriated by incumbents rather than translated into citizen welfare. In such cases, cooperation risks becoming a vehicle for cooperative rent extraction rather than efficiency.

Rather than focusing on formal mechanisms, the main message of the paper is that institutional design matters critically when jurisdictions are heterogeneous. Policies aimed at fostering cooperation should therefore be carefully tailored to the specific cost structure of the organization.

From a welfare perspective, these results imply that cost asymmetries influence not only individual effort choices but also aggregate inefficiency through rent dissipation. These welfare comparisons should be interpreted as second-best evaluations, since rent-seeking is itself socially wasteful and institutional constraints limit feasible policy responses. Institutional arrangements that ignore such asymmetries may therefore lead to suboptimal outcomes. These findings have direct implications for policy-makers, regulators, and cooperative managers. Institutional rules that promote cooperation should take into account underlying cost asymmetries, as coordination may increase inefficiencies when low-cost agents dominate collective decisions.

The policy implications are clear. Performance evaluation systems should move beyond simple output indicators and incorporate structural conditions such as fiscal capacity, administrative capacity, and bureaucratic improvement costs. Rankings based solely on observed service levels risk rewarding municipalities with favourable initial conditions rather than genuine efficiency gains. Equalization policies should not only address fiscal disparities but also reduce gaps in bureaucratic improvement costs. Capacity-building policies, including support for digitalization, staff training, procurement expertise, and process simplification, should prioritize administratively weaker jurisdictions to restore competitive balance and strengthen accountability. Cooperation agreements must be accompanied by robust transparency and monitoring mechanisms. External audits, mandatory disclosure of cost savings, and citizen oversight boards can prevent cooperation from becoming a tool for cooperative rent extraction. When fixed costs make cooperation attractive, cost-sharing rules should link savings to measurable improvements in service quality, ensuring that economies of scale benefit citizens rather than incumbents.

Ultimately, our findings suggest that cooperation is not a panacea for efficiency. While IMC can reduce disparities, it may simultaneously undermine electoral discipline and increase rent-seeking. Policymakers must therefore balance economies of scale with mechanisms that preserve accountability. Governance reforms should move beyond output-based indicators and adopt integrated frameworks that combine performance metrics with structural and cost-based information. This approach can better detect strategic manipulation and ensure that cooperation serves its intended purpose: improving efficiency without eroding democratic control.

Future research should empirically validate these mechanisms and explore institutional designs capable of reconciling economies of scale with political accountability in fragmented municipal systems. Experimental and behavioural approaches could further illuminate how voters respond to structural disparities and cooperative arrangements. Only by addressing these hidden incentives can local governance reforms deliver on their promise of better services and stronger democratic accountability.

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The authors declare no conflicts of interest.

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