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Bureaucratic Reshuffling and Efficiency: Do n-Competing Bureaus Determine Inefficient Results?

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Abstract: Governments often support their preferences for decentralised (centralised) bureaucracies on the grounds of efficiency considerations (production side). Here, we consider the demand side, i.e., whether the government perception of citizens' demand for differentiated goods/services might increase efficiency by simply reshuffling bureaucratic production activities. We represent the budgetary process—between an incumbent governing party and n-competing bureaus producing differentiated goods/services—as a simultaneous Nash-compliance game with complete information. On these grounds, we analyse—in terms of public production, players' rents and payoffs—the effects of increasing competition (as for the number of bureaus) in the political–bureaucratic market. Moreover, we evaluate, *ceteris paribus*, the effects of bureaucratic reshuffling from the point of view of society, assumed to prefer those policies that approximate social efficiency by minimising bureaucratic and political rents.

Keywords: competing bureaucracies; compliance games; bureaucratic merging

1. Introduction

The typical bureaucratic relationship, depicted by the traditional Public Choice literature originated after the work by [1], is of monopoly-type (for a different point of view, see the recent review [2]). Under the Public Choice scheme, the government decides the bureau's budget to be (in principle) devoted to production activities and to its own political rents, whereas the typical bureau allocates this budget between production and discretionary profits. Almost by definition, a monopoly bureau, when choosing how to allocate its own budget, has little incentive to be efficient, instead having a much stronger incentive to divert resources toward its own discretionary profit. The same holds true for the government, which chooses the bureaucratic budget that maximises its political rents with the electorate, and rarely argues that bureaucracies are run inefficiently. (In this respect, notice that the authors of [3] investigate how aspects of "civil service" systems of personnel management interact with bureaucratic discretion in a dynamic model and may or may not be interested in policy choices *per se*. With a different focus, which mainly relates to the institutional context of the United States Senate, [4] presents a set of actors who possess the right to determine which policies will be enacted and an opposing set of actors who possess the right to delay the enactment of those policies.).

One of the main propositions from the Public Choice literature is that, to assure improvement in efficiency, this budget appropriation procedure must be modified. One approach to this problem is, thus, addressed to control politicians and bureaus so as to prevent waste by allowing for a reduction of bureaus' discretionary profits and government's political rents. Although, this modification seems to be simple and, at least in part, effective, it does not solve the problem in full. For example, the introduction

of further agents only controlling and dispensing resources might be costly and one could weigh the extent to which control costs induce benefits from waste reduction (see [5]). Moreover, the introduction of control agents whose aim is to safeguard public funds would reduce the diversion of public funds for discretionary purposes, unless such agents pursue interests of their own, so that the increased number of players results in an increased number of resources' claimants instead of increased benefits to the electorate [6].

The starting point of this paper is different because (i) what it is observed in reality is substantially different from the 1 government-1 bureau relationships depicted by the standard literature. Seeking examples fitting to the original Niskanean-type bureaucracy, we can barely find spatial activities of NASA in the U.S. and conclude that it is almost always the case that the government deals with more than one bureau for the public supply of goods and services or that a common bureau supplies more than one good to different levels of government as in [7]. There are only few exceptions in the literature considering competing bureaucracies. On the one side, [1] (chapter 2) argues that the effects of competition among bureaus in supplying the "same or similar" services may benefit voters/taxpayers at a local level only if a "voting by feet" mechanism operates; otherwise, because of the "review processes" the competitive results in terms of budget and output are invariant with respect to the monopoly solution. On the other side, [8] develop an "exchange based theory" of bureaucratic supply which focuses on the dual relation between bureaucratic superiors and subordinates. More recently, [9] address this issue by analysing a form of oligopolistic competition between bureaucracies producing differentiated goods demanded by the same government. Moreover, (ii) in reality, the policies implemented to improve efficiency of public bureaucracies have been of a different nature with respect to what suggested by the literature.

Consider the following stylised facts related to the UK. The authors of [10] report 10 cases of bureau reshuffling from 1971–1984. In particular, during the 1980s, the UK Conservative governments implemented bureaucratic mergers in Whitehall by joining the existing national bureaus, previously split by the Labour governments of the 1970s, who had preferred instead bureaucratic demergers. As the authors of [11] pose it:

> "Evidently, there were two reasons why Mr Callaghan judged the benefits of a separate transport department so compelling. First, he doubted the policy coherence of the DoE. He had never being convinced of the organisational and—more important—the political advantages of very large departments. A component of this scepticism may well have been concern about the implications at Cabinet level of such extensive concentrations of power. Secondly, it was certainly a convenient time politically (...) What does seem clear is that the initiative came from the Prime Minister personally: it was not a popular idea among civil servants. Once again, however, officials moved with commendable speed. Within 24 h of the Head of Civil Service being advice of Mr Callaghan's intention the basic arrangement had been settled (...)". ([11], pp. 116–117)

> "(In 1979) Mrs Thatcher did not create any new departments. She merged the small and youthful Department of Prices and Consumer Affairs with the Department of Trade and removed the remaining (largely nominal) independence of the Ministry of Overseas Development, but otherwise left matters alone. Her electoral victory in June 1983 followed this departmentally conservative precedent. Again, there were no new departments and changes lay principally in the direction of mergers and excision.". ([11], p. 120)

In the intentions, any bureaucratic reshuffling has been politically justified by efficiency reasons, with a concept of efficiency associated, at least in the UK, to bureaucratic merging by the Conservative Governments and to bureaucratic demerging by the Labour ones. More recently, however, in Italy, the point of view on bureaucratic reshuffling has been quite similar to that of Conservative type in Britain. Beginning with Amato (prime minister from June 1992 to April 1993) up to Renzi (prime minister from February 2014 to December 2016), quite often Italian governments related efficiency

to bureaus' merging. By arguing that one of the causes of the Italian public finance crisis (mainly when accompanied by unfavourable business cycle) was bureaucratic inefficiency, a number of drastic measures were proposed and implemented to reduce, not exactly and not only the bureaucratic budget, but eventually the "bureaus' number", by means of an extensive merging of public bureaus. (Notice here that the specular issue of bureaucrats serving multiple principals is, for example, analysed in [12].)

Indeed, quite often, the main motivation for merging is cost reduction, thanks to economies of scale and scope, lower management costs and the gain in monopsony power in negotiating with private sector providers (see [13,14] for the United Kingdom; [15] for Italy). The academic literature also suggests political and institutional motivations for bureaucratic reorganization. Governments interested in policy reforms may see bureaucratic reshuffling as a way of strengthening their control over the bureaucracy (see [16] on environmental policy in the US states; [17] on the Italian NHS). Majoritarian electoral systems may facilitate the drive for bureaucratic reorganization ([18] for the United Kingdom) which has been also related to partisanship or to electoral considerations (see, for example, [19–21]).

Our argument here is different in that, other things being equal, bureaucratic reshuffling might depend on whether the government perceives the citizens' demand as a demand for substitutable or complementary services. With this assumption this paper aims at evaluating, *ceteris paribus*, those policies addressed to increase efficiency by simply reshuffling bureaucratic production activities. The evaluation is done from the point of view of society, which is assumed to consider as "reasonably efficient" that regime mainly reducing social waste of resources (see below).

The paper proceeds as follows. In Section 2 we set up the general framework of n-bureaus competing for the budget. In Section 3 we explore the results of the symmetric simultaneous compliance game under the assumption of n identical agencies as for their demand and cost. In Section 4 we consider society's evaluation of the bureaucratic reshuffling. Conclusions follow in Section 5.

2. Materials and Methods

2.1. The Basic Assumptions

Following the authors of [22] and a large empirical evidence supporting this same view of public bureaucracy (see, for example, [23–27]), we assume that, as in most European countries, the relationship between politicians and public managers is characterised by absence of control from the electorate so that politicians in power, as well as public managers, are the residual claimants of the resources devoted to public production. Thus, the incumbent government is concerned with the maximisation of both the net benefits from bureaucratic outputs (assumed to represent the electorate wishes) and its political rents represented by what the politicians in charge can divert from bureaucratic production. To represent the government's benefits from the aggregate bureaucratic outputs, we extend the methods in [28,29] to the n producers' case. We intend to represent the public interest motive in the government's payoff, mainly on the basis of its perception of the citizens' demand for bureaucratic goods and services that can be substitutable/independent/complementary for each other. Government perception of product differentiation from the demand side, in turn, shall be captured by the demand system for bureaucratic output (see below). Moreover, we assume that each bureau crucially evaluates its own output on the basis of the demand as formulated by the governing party. This implies that the bureaus positively evaluate their own production activity. Following most of the theory of bureaucracy [30,31], each bureau's payoff shall also include a term representing its discretionary profits.

As in [22], the budgetary process shall be represented as a compliance game: Each bureau contracts with the government for its budget, given by the proportion of resources the governing party decides to appropriate to each agency (i.e., the governing party's level of compliance) in exchange of the agency's willingness to produce a certain level of output (i.e., the bureau's level of compliance). Each player has complete information about each opponent's payoff and the players' information sets are assumed to be "common knowledge". All the players determine the outcome of the game in terms of compliance and therefore both in terms of output and "slack". We essentially explore how the increased number of

players affects the interior compliance equilibria under different contexts about the nature of the goods produced. On this basis, we evaluate bureaucratic reshuffling pro or cons. competition.

2.2. The Model

We borrow from both the standard approach, the economic theory of bureaucracies (see, among others, [1,5,6,30]) and from the public choice literature's insight that a proper designing of the organizational form of bureaucratic supply [32–38] can, in turn, increase bureaucratic efficiency. To study the relation between an incumbent government and n bureaus, we extend the methods in [22] and specify the government's' preferences for bureaucratic output as a quadratic utility function, which is assumed to represent the electorate wishes (cf. [39]). This assumption, although limiting the generality of the results, makes it possible to solve explicitly for the interior equilibrium values, so as to conduct comparative static analysis and, thus, clarify and make more intuitive the working of the model. On this basis, the governing party objective function is represented as follows.

$$Mg = \underbrace{\sum_{i=1}^{n} \alpha_i Q_i - \sum_{i=1}^{n} (\beta_i {Q_i}^2)/2 - \sum_{i=1}^{n} \sum_{j>i}^{n} \gamma_{ij} Q_i Q_j}_{\text{voters' preferences for the n bureaucr atic outputs}} + \underbrace{Q_0}_{\text{residual resources}} \tag{1}$$

where $\sum_{i=1}^{n} \alpha_i Q_i - \sum_{i=1}^{n} (\beta_i {Q_i}^2)/2 - \sum_{i=1}^{n} \sum_{j>i}^{n} \gamma_{ij} Q_i Q_j$ represents the government's (as voters' representatives) evaluation of the bureaucratic output. The residual term $Q_0 = R - \sum_{i=1}^{n} v_i Q_i = R - \sum_{i=1}^{n} B_i$ represents the political rents for the governing party, as given by the difference between the total resources and the sum of the n budget B_i appropriated to each agency for the production of the good i. Notice here that the governing party's preferences would also be represented as $U(Q_0, Q_1, ..., Q_n)$, where Q_i represents the good produced by the bureau i ($i = 1, ..., n$) and Q_0 is a numeraire that is good at representing what the party can buy with the resources it saves after having appropriated the budgets to all the agencies. The function U is represented by a quasi linear function $U(Q_0, Q_1, ..., Q_n) = Q_0 + M(Q_1, ..., Q_n)$ where function M is increasing and concave. If the governing party maximizes U subject to its budget constraint $R \geq Q_0 + \sum_{i=1}^{n} v_i Q_i$, where R is the amount of resources available for the services produced by the n bureaus, the first-order conditions are given by $\partial M / \partial Q_i = v_i$, which corresponds to the standard concept of demand or marginal valuation function.

The payoff function Mg gives rise to a linear demand system for bureaucratic outputs and the inverse government's demands for the goods produced by the n agencies are given by

$$\begin{aligned} v_1 &= \alpha_1 - \beta_1 Q_1 - \sum_{j=2}^{n} \gamma_{1j} Q_j \\ v_2 &= \alpha_2 - \beta_2 Q_2 - \sum_{j\neq 2}^{n} \gamma_{2j} Q_j \\ &\cdots \\ v_n &= \alpha_n - \beta_n Q_n - \sum_{j=1}^{n-1} \gamma_{nj} Q_j \end{aligned} \tag{2}$$

where v_i ($i = 1, ..., n$) is the maximum "price" per unit of output that the governing party is willing to pay for good i. $\gamma_{ij} = \gamma_{ji}$ indicates the degree of differentiation between good i and good j: when $\gamma_{ij} = 0$, the goods i and j are independent, whereas for $\gamma_{ij} > 0$, i and j are substitutes for each other. Thus, $\sum_{i\neq i}^{n} \gamma_{ij} Q_j$ indicates how, depending on the degree of differentiation, the demand's changes for goods other than i affect the demand for i.

We assume that each agency has a positive evaluation of both its output and its discretionary profit. We express the payoff function for each agency, Mh_i ($i = 1, ..., n$), as the sum of the total evaluation of agency-i's own output plus the agency's discretionary profit Π_i, that is,

$$Mh_i = \underbrace{\alpha_i Q_i - (\beta_i {Q_i}^2) - \sum_{j \neq i}^{n} \gamma_{ij} Q_i Q_j}_{bureau-i's\ evaluation\ of\ its\ own\ output} + \underbrace{\Pi_i}_{\substack{bureau-i's \\ discretionary \\ profits}} \quad , \quad i = 1, \ldots . n \tag{3}$$

where, given the demand system in (2), $Q_i(\alpha_i - \beta_i Q_i - \sum_{j \neq i}^{n} \gamma_{ij} Q_j) = v_i Q_i$ denotes the agency-i's evaluation of its own output. The total cost function for the production of each good, i, is simply given by $TC_i = c_i Q_i$, where the marginal and unit cost $ci > 0$ represents the minimum production cost for good i. Thus, in the absence of rent-seeking behaviour, the bureaus would get production efficiency. The budgetary process transforms their potential (ex ante) efficiency into two forms of inefficiency that depend on the government's and the bureau's rents. Both these rents can be interpreted as a component of (to be added to) the actual (social) unit cost of production that increases accordingly. Note, however, that the assumption of rent-seeking behaviour of the players does not determine, *per se*, an increase in the social production cost at equilibrium. It can be shown that, if the government demands for one good only, the budgetary process gives raise to players' full compliance at equilibrium that, in turn, implies zero equilibrium rents, see [40].

To represent the budgetary process, we extend the methods in [22] and reformulate the relationship between the political party in power and n bureaus as a compliance game, where the government negotiates over the budget with the bureaus. Following the game-theoretic approach of the authors of [41], as applied in [22,42], to compliance relationships inside bureaucracies, each agent chooses simultaneously its own Nash compliance level. In particular, the government sets the share of public resources it allocates to the bureaus as a budget, and the bureaus set the share of their budget that is actually used for producing the desired output. Simultaneous bilateral Nash budget games are played between the government and each single bureau. Similar to [43] Nash-in-Nash bargaining solution (the authors of [44] review the industrial organization and labor economics literatures adopting the [43] solution and provide microeconomic foundations for it), each bilateral negotiation selects its Nash equilibrium under the assumption that a Nash equilibrium will occur in the other negotiation as well. Then, the equilibrium bureaucratic organizational form and compliance levels arise in subgame perfect Nash equilibrium.

We assume that all the players determine the outcome of the game by deciding, respectively, how much of the exogenously given resources R to appropriate to each agency as budgets and how much of each agency budget to spend on producing the related output. Each player has an infinite number of choices along his strategy dimension. The governing party's strategy dimension with respect to the bureau i is $G_i \in [0, 1]$, and $g_i \in G_i$ is that particular strategy of the governing party indicating the share of the resources, R, available for the n services in question that the governing party chooses to appropriate to agency-i ($i = 1, \ldots , n$) as budget, $B_i = g_i R$, so that $1 - \sum_{i=1}^{n} g_i$ represents the share of resources retained by the party in power as rents after having allocated the budgets among the n bureaus. Similarly, the strategy dimension of agency-i ($i = 1, ..., n$), H_i, is assumed to go from 0 to 1, and any particular strategy, $h_i \in H_i$, denotes the share of agency-i total budget, B_i, which agency-i head actually devotes to the production of the output Q_i, whereas the remaining $(1 - h_i)$ denotes the proportion of the budget kept by agency-i as discretionary profit, $\Pi_i = (1 - h_i)B_i = (1 - h_i)g_i R$. Each player has complete information about each opponent's payoff and the players' information sets are assumed to be "common knowledge".

Given the total resources, R, available for the goods produced by the n bureaus and given the total costs for bureau i, $TC_i = c_iQ_i$ for $i = 1, ..., n$, we have $Q_i = (h_i\, g_i\, R/c_i)$, and thus we can express the arguments of all the payoff functions in terms of the parameters and of the strategy choices (compliance level) of the players

$$\begin{aligned} Mg \quad &= \sum_{i=1}^{n} \alpha_i(g_ih_iR/c_i) - \sum_{i=1}^{n} \beta_i(g_ih_iR/c_i)^2/2 + \\ &- \sum_{\substack{i=1 \\ i<j}}^{n} \sum_{j=1}^{n} \gamma_{ij}(g_ih_iR/c_i)(g_jh_jR/c_j) + R(1 - \sum_{i=1}^{n} g_i) \end{aligned} \tag{4}$$

$$Mh_i = \alpha_i(g_ih_iR/c_i) - \beta_i(g_ih_iR/c_i)^2 - \sum_{j\neq i}^{n} \gamma_{ij}(g_ih_iR/c_i)(g_jh_jR/c_j) + (1-h_i)g_iR \qquad i = 1, \ldots n \tag{5}$$

3. Results: The Symmetric Simultaneous Process with Linear Demand and Cost Functions

We now analyse the interior solution for the symmetric process: the n bureaus face the same demand and cost functions, for which the governing party behaves symmetrically with the bureaus. We shall consider the equilibrium values of the compliance levels, rents and final payoffs of the players for the values of $\gamma \geq 0$.

Setting for $\alpha_i = \alpha, \beta_i = \beta$, $\gamma_{ij} = \gamma$ and $c_i = c$ (for all $i, j = 1, \ldots, n$), we maximise Mg in (4) with respect to each g_i. Solving the first-order conditions for g_i, we obtain the best reply function for the governing party with respect to bureau i, in terms of both the agencies' strategy dimensions and its own strategy dimensions with respect to each bureau j ($j = 1, ..., n$ and $j \neq i$), that is,

$$g^R{}_i = \frac{h_i(\alpha c - \gamma R \sum_{j\neq i}^{n} g_jh_j) - c^2}{\beta h_iR} \qquad i = 1, \ldots, n \tag{6}$$

Each bureau, in turn, maximises its Mh_i ($i = 1, ..., n$) in Equation (5) with respect to h_i, and, solving the first-order conditions for h_i, obtains its best reply function in terms of the strategy dimension of the other players,

$$h^R{}_i = \frac{c(\alpha - c) - \gamma R \sum_{j\neq i}^{n} g_jh_j}{2\beta g_iR} \qquad i = 1, \ldots, n \tag{7}$$

where the above best reply functions have been obtained by solving the model for the unconstrained case in which the bureaus face the symmetric demands function, as for both of their intercepts $\alpha_i = \alpha$ and their slopes $\beta_i = \beta$, and have the same production costs, $c_i = c$.

The interior equilibrium strategies for the players are obtained by solving for the system given by the 2n reaction functions in Equations (6) and (7), with parameters' restrictions for the S.O.C. to be satisfied require $(\beta + \gamma(n-1)) > 0$ and $(\beta - \gamma) > 0$, which are always satisfied for $\beta > \gamma \geq 0$:

$$\hat{g}_i = \frac{(\alpha - c)[(n-1)\gamma c + c\beta + \alpha\beta]}{R\,[(n-1)\gamma + 2\beta]^2} \qquad i = 1, \ldots, n \tag{8}$$

$$\hat{h}_i = \frac{c[(n-1)\gamma + 2\beta]}{[(n-1)\gamma c + c\beta + \alpha\beta]} \qquad i = 1, \ldots, n \tag{9}$$

where $\hat{}$ indicates the interior equilibrium solution for the simultaneous compliance game. Given the compliance equilibrium strategies in Equations (8) and (9), we work out the equilibrium values of the rents for the players $\hat{\Pi}h_i = (1 - \hat{h}_i)\hat{g}_iR$, ($i = 1, 2$) and $\hat{\Pi}g = (1 - \sum_{i=1}^{n} \hat{g}_i)R$, respectively, for the individual

bureau and the incumbent government. Moreover, by substituting back Equations (8) and (9), for $i = 1, ..., n$, into the payoff functions Mg in (4) and Mh_i in (5), the values for the equilibrium payoffs for all players are obtained:

Equilibrium discretionary profits for bureau-i:

$$\hat{\Pi}h_i = \frac{(\alpha - c)^2\beta}{[(n-1)\gamma + 2\beta]^2},$$

Incumbent government's rents in equilibrium:

$$\hat{\Pi}g = R - \frac{n(\alpha - c)[(n-1)\gamma c + c\beta + \alpha\beta]}{[(n-1)\gamma + 2\beta]^2},$$

Equilibrium value of the government's payoff:

$$\hat{M}g = R + \frac{[(n-1)\gamma + \beta]n(\alpha - c)^2}{2[(n-1)\gamma + 2\beta]^2}$$

Equilibrium value of the bureau-i's payoff:

$$\hat{M}h_i = \frac{[(n-1)\gamma c + 2\beta\alpha](\alpha - c)}{[(n-1)\gamma + 2\beta]^2}.$$

Even at first glance, it is evident that the players' payoffs and rents are affected by the number of competing bureaus in the political bureaucratic market (cf. the above payoff with those obtained in [22]). However, before considering the extent of any bureaucratic reshuffling, so as to assess the impact of any policy *pro/cons* bureaucratic merging, we introduce a measure for society evaluation.

Instead of formulating a welfare function for society, we simply study the behaviour of an index of society well-being characterised as follows. As previously mentioned, in the absence of rent-seeking activities, outputs would be produced at minimum social cost for the taxpayers: $TC_i = c_iQ_i$ for all $i = 1, \ldots, n$. Thus, the gap between the production cost and the social cost of any good i (that is, the resources coming from taxation) is the only form of inefficiency in this model. From the point of view of the society, the aggregate level of rents can be reasonably interpreted as an approximation of the society's "discontent" ($\hat{S}D$) about the production of the bureaucratic goods/services as follows:

$$\hat{S}D = \hat{\Pi}g + \sum_{i=1}^{n} \hat{\Pi}h_i = R - \frac{cn(\alpha - c)}{[(n-1)\gamma + 2\beta]}$$

That is, society's well-being with respect to government–bureaucracy relations requires that the lower the rent-seeking activities, the higher the compliance levels and the higher society's well-being.

4. Discussion: Society's Evaluation of Bureaucratic Reshuffling

We shall consider the effect of bureaucratic reshuffling from the point of view of society limiting the analysis to the following assumptions.

(1) $(\alpha - c) > 0$, the government's reservation price for each bureaucratic good is higher than the marginal and unit cost of the good.
(2) $c > 0$, i.e., positive marginal and unit cost.

Either

(3) $Q_i = \frac{R\hat{g}_i\hat{h}_i}{c} = \frac{(\alpha-c)}{c[(n-1)\gamma+2\beta]} > 0$, i.e., positive level of output i at equilibrium. This requires $[(n-1)\gamma + 2\beta] > 0$, which is always satisfied for $\gamma \geq 0$.

or

(4) Positive level of each bureau-i production at equilibrium; this requires $\gamma \geq \beta/(n-1)$.

The results for all the players and society are reported in Table 1, below, which shows how they vary at the interior equilibrium for the values of $\gamma = 0$ (i.e., independent goods) and $\gamma > 0$ (substitute goods). The latter case shall be analysed for either $\gamma = \beta/(n-1) > 0$, which implies positive production for each bureau i (assumption (4) above), but also for the highest degree of substitutability, $\gamma = \beta > 0$ (or "genuine competition", cf. [22]), which implies positive production of good i, with some bureau produces nothing (assumption (3) above).

Table 1. Equilibrium values for independent and substitute goods.

	$\gamma = 0$	$\gamma = \beta/(n-1) > 0$	$\gamma = \beta > 0$
$\hat{M}g$	$R + \frac{n(\alpha-c)^2}{8\beta}$	$R + \frac{n(\alpha-c)^2}{9\beta}$	$R + \frac{n^2(\alpha-c)^2}{2(n+1)^2\beta}$
$\partial\hat{M}g/\partial n$	$\frac{(\alpha-c)^2}{8\beta} > 0$	$\frac{(\alpha-c)^2}{9\beta} > 0$	$\frac{n(\alpha-c)^2}{(n+1)^3\beta} > 0$
$\lim_{n\to+\infty} \hat{M}g$	$+\infty$	$+\infty$	$R + \frac{(\alpha-c)^2}{2\beta}$
$\hat{\Pi}g$	$R - \frac{n(\alpha^2-c^2)}{4\beta}$	$R - \frac{n(\alpha^2-c^2)}{9\beta}$	$R - \frac{n(\alpha-c)(nc+\alpha)}{(n+1)^2\beta}$
$\partial\hat{\Pi}g/\partial n$	$-\frac{(\alpha^2-c^2)}{4\beta}$	$-\frac{(\alpha^2-c^2)}{9\beta}$	$\frac{(\alpha-c)[n(\alpha-2c)-\alpha]}{(n+1)^3\beta}$
$\lim_{n\to+\infty} \hat{\Pi}g$	$-\infty$	$-\infty$	$R - \frac{c(\alpha-c)}{\beta}$
$\hat{M}h_i$	$\frac{\alpha(\alpha-c)}{2\beta}$	$\frac{(2\alpha+c)(\alpha-c)}{9\beta}$	$\frac{[(n-1)c+2\alpha](\alpha-c)}{(n+1)^2\beta}$
$\partial\hat{M}h_i/\partial n$	**unaffected by n**	**unaffected by n**	$-\frac{(\alpha-c)[2(2\alpha-c)+c(n-1)]}{(n+1)^3\beta}$
$\lim_{n\to+\infty} \hat{M}h_i$	**unaffected by n**	**unaffected by n**	0
$\hat{\Pi}h_i$	$\frac{(\alpha-c)^2}{4\beta}$	$\frac{(\alpha-c)^2}{4\beta}$	$\frac{(\alpha-c)^2}{\beta(n+1)^2}$
$\lim_{n\to+\infty} \hat{\Pi}h_i$	**unaffected by n**	**unaffected by n**	0
$\frac{\partial\hat{\Pi}h_i}{\partial n}$	**unaffected by n**	**unaffected by n**	$-\frac{2(\alpha-c)^2}{(n+1)^3\beta}$
$\hat{S}D = \hat{\Pi}g + n\hat{\Pi}h_i$	$R - \frac{nc(\alpha-c)}{2\beta}$	$R - \frac{nc(\alpha-c)}{3\beta}$	$R - \frac{nc(\alpha-c)}{(n+1)\beta}$
$\frac{\partial(\hat{S}D)}{\partial n}$	$-\frac{c(\alpha-c)}{2\beta}$	$-\frac{c(\alpha-c)}{3\beta}$	$-\frac{c(\alpha-c)}{(n+1)^2\beta} < 0$
$\lim_{n\to+\infty} \hat{S}D$	$-\infty$	$-\infty$	$R - \frac{c(\alpha-c)}{\beta}$

Consider, first, the incumbent government payoff. For both independent and (more or less) substitute goods, the government's payoff increases with the increase of n, and in both cases $\partial\hat{M}g/\partial n$ is positive. However, for independent goods and $\gamma = \beta/(n-1) > 0$, a further increase of n greatly increase the government's payoff as $\lim_{n\to+\infty} \hat{M}g \Big|_{\substack{\gamma=0 \\ \gamma=\beta/(n-1)}} = +\infty$, where the notation $\Big|_{\substack{\gamma=0 \\ \gamma=\beta/(n-1)}}$ indicates that the function under consideration is evaluated at $\gamma = 0$ and at $\gamma = \beta/(n-1)$). For perfect substitute goods (or genuine competition), there is a lower, finite increase of the government's payoff.

In the latter case, in fact, $\partial^2 \hat{M}g/\partial n^2\big|_{\gamma=\beta} = -\frac{(2n-1)(\alpha-c)^2}{(n+1)^4\beta} < 0$ and $\underset{n\to+\infty}{Lim}\, \hat{M}g|_{\gamma=\beta} = R + \frac{(\alpha-c)^2}{2\beta}$. In either case, however, the increase of the government's payoff is mainly due to the positive effect of demerging on the production activities. Notice that, for both $\gamma = 0$ and $\gamma = \beta/(n-1) > 0$, the government political rents are greatly reduced by the increase of n since $\underset{n\to+\infty}{Lim}\, \hat{\Pi}g\Big|_{\substack{\gamma=0 \\ \gamma=\beta/(n-1)}} = -\infty$. Thus, the positive value of $\hat{M}g$ in equilibrium means that the negative impact of the rents on the government's payoff is more than counter-balanced by the positive impact of the increased production generated by the demerging. When $\gamma = \beta$, sign$(\partial\hat{\Pi}g/\partial n)$ = sign $[n(\alpha - 2c) - \alpha]$, which is positive only if $[(n-1)\alpha - 2nc] > 0$, thus depending on the impact of n on the gap between the reservation price and the actual unit cost of production: the increase of n affects the reservation price to a lower extent than the unit costs, which is the reason why demerging determines a lower reduction of the political rents when goods are perfect substitute, as well as a lower increase of the government's evaluation of bureaucratic production.

Proposition 1. *Bureaucratic demerging positively affects the government payoff. This effect is mainly due to the increase of production due to demerging. Having both substitute and independent goods demerging reduces the government political rents and, with the higher impact in rents reduction, also lowers the degree of substitutability.*

Consider now the effect of demerging on the individual bureau's payoff and discretionary profits. When goods are independent, and for a low degree of substitutability among bureaucratic activities, both the bureau-i's payoff and its discretionary profits are unaffected by the degree of competition intended as the number of competitors. (Notice here that only under the assumption of a cooperative behaviour among the bureaus, which is not analysed here, the increase of n would increase the aggregate bureaucratic profits, as, trivially, $\underset{n\to+\infty}{Lim}\, (n \cdot \hat{\Pi}h_i)\Big|_{\substack{\gamma=0 \\ \gamma=\beta/(n-1)}} = +\infty$). The opposite occurs for perfect substitute goods. In this case, demerging greatly affect the individual bureaucratic discretionary profits and payoffs, which are both positive and decreasing in n, and, taking their limit for n going to infinity, they all tend to zero (also cf. [9], which shows how the "genuine" competition reduces the bureaus' negotiation power).

Proposition 2. *Bureaucratic demerging does not affect the individual bureau's payoff and discretionary profits when goods are independent or for a low degree of substitutability. When goods are perfect substitute, bureaucratic demerging negatively affects both the individual bureaucratic payoff and discretionary profits, which both tend to zero with the increase of n.*

Finally, regarding the society well-being as (negatively) measured by the aggregate level of the players' rents, notice that, in all ranking from independent to perfect substitute goods, the total rents are reduced by bureaucratic demerging as $\frac{\partial\hat{S}D}{\partial n} < 0$. However, when goods are independent, $\underset{n\to+\infty}{Lim}\, \hat{S}D\Big|_{\substack{\gamma=0 \\ \gamma=\beta/(n-1)}} \to -\infty$. In this case, the effects of demerging on the political rents is dominant with respect to the effect of demerging on bureaucratic profits. Thus, with independent goods, "social inefficiency" is greatly reduced by the increase of bureaus' competition, notwithstanding the fact that the individual bureaucratic rents are unaffected. When goods are perfect substitute $\underset{n\to+\infty}{Lim}\, \hat{S}D|_{\gamma=\beta} = R - \frac{c(\alpha-c)}{\beta}$ and $\frac{\partial\hat{S}D}{\partial n}\Big|_{\gamma=\beta} < 0$. Also, in this case, the effects of demerging on the political rents are dominant with respect to the effect of demerging on bureaucratic profits: The aggregate level

of rents is positive, although decreasing, in spite of the behaviour of the bureaucratic discretionary profits which tend to zero.

Proposition 3. *Bureaucratic demerging always positively affects (although to a different extent) the society well-being. In all the cases, from independent to perfect substitute goods, the aggregate rent-seeking activities are reduced by the increase of n.*

5. Conclusions

The Public Choice literature has often discarded any consideration on how government's perception of citizens' demands affects bureaucratic institutions design (see, for example, [45]). The widely spread view is that any government is rent-seeker whatever its affiliation is, as well as bureaucrats. Moreover, a number of stylised facts, both in the UK and in Italy, suggest that institutional choices of bureaucratic organisation has been quite often addressed by governments associating a higher efficiency to bureaucratic merging on production side considerations.

In this paper, by taking as exogenously given the amount of public expenditures (i.e., the funds coming from taxpayers) devoted to bureaucratic activities, we have represented the public interest motive in the government's payoff, mainly on the basis of its perception of the citizens' demand for bureaucratic goods and services that can be substitutable/independent/complementary for each other. Moreover, we assumed that each bureau crucially evaluates its own output on the basis of the demand as formulated by the governing party. On this basis, we have formally described the budgetary equilibrium by means of a Nash compliance game between the incumbent government and n bureaucrats in order to investigate whether and how bureaucratic reshuffling, *ceteris paribus*, affects society well-being.

We have taken as an index of "society's discontent" about the bureaucratic production, the aggregate level of the government's and the bureaucrats' rents, which, in the model, represents the gap between the social costs of production and the actual production costs. We have shown that, indeed, any demerging of bureaucratic organisation, although to a different extent depending on the nature of the goods/services, increases social efficiency of the public bureaucracies.

We have only considered one side of the coin (i.e., the *ceteris paribus* reshuffling), with a further step for the overall evaluation of any policy being that of removing the assumption of exogenously given taxation to evaluate the joint impact of bureaucratic reshuffling with a tax cut (and thus of a reduction of the resources for public production).

We suggest that keeping the same index of society's discontent makes the results of this model more robust, given that, say, the negative impact of merging in the public production is exacerbated by the presumed reduction of the public funds devoted to it. Yet, we should think of a new index of society's well-being that includes voters' preferences for high/low level of public production joint with society's tastes for high/low level of taxation. This is a topic we are currently working at.

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