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Determinants of service quality in bureaucracy: Parkinson's theory at work

Beate Jochimsen

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Beate Jochimsen†

Free University of Berlin

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Abstract

Parkinson's law states that work expands to fill the time available for its completion and that the number of administrators in an office is bound to increase over time. An unique laboratory to test Parkinson's ideas are vehicle registration offices in Germany. Using their data we found empirical support for Parkinson's law: First, service quality is no better in offices that have more staff per case. Second, service quality is worse if the service procedure is disaggregated into multiple smaller sub-services. Third, the staff size is a convex function of the number of customers. These results are robust to specifications in various alternative models.

Keywords: Bureaucracy, Parkinson's law, Waiting time, Service Quality, Queueing Theory.

JEL classification numbers: H83 (Public Administration), D02 (Institutions: Design, Formation, and Operations), C21 (Cross-Section Models), C41 (Duration Analysis).

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†Freie Universität Berlin, Boltzmannstr. 20, D-14195 Berlin, Germany, phone: +49 30 838-54371, e-mail: beate.jochimsen@wiwiss.fu-berlin.de.

The bureaucracy is expanding to meet the needs of an expanding bureaucracy.
[Anonymous]

1 Introduction

The general public often mistrusts the public services, and a bureaucracy is often seen as a particular kind of joke, rather like 'celebrity' and 'dirty' jokes. While some social scientists have pointed to the beneficial effects of bureaucracy, among them Max Weber who argued that a bureaucracy has a positive effect on the rule of law, the focus of many economists has been on its disadvantages. In their theorizing about such organizations they have discussed the reasons for their malfunctioning and slack (e.g. Niskanen 1971, Wyckoff 1990). The behavior of for-profit firms is, at least partly, aligned with welfare objectives. Most notably, it is argued that the pressure of competition eliminates or reduces inefficiency, and even where market competition is not particularly strong, such as in a monopoly, the profit motive of firms stimulates cost minimizing behavior. The public service sector by contrast is subject to different rules. The pressure of competition and a profit motive are often completely absent.

Parkinson (1957) observed that, after the First World War, the number of officers in the British Navy administration did not remain constant, it rose, despite the fact that the number of ships and sailors had declined sharply. He concluded that work expands to fill the time available for its completion, and derived growth dynamics from the bureaucrats' incentives to expand by creating a hierarchy whose maintenance and control dissipates further work effort. These observations and conclusions are called Parkinson's law.

The early economic theory of internal organization is based on similar insights (Leibenstein 1966, 1978). Modern contract theory starts from the perspective that the public administration is established and controlled by a principal – a politician, or, ultimately, the voter. A rigorous and monolithic framework for studying these aspects was developed by Laffont and Tirole in a series of papers, and in their monograph (1993). Their work also triggered a lot of further research. Their analysis showed the theoretical limits to the optimal governance of a bureaucracy and it came up with a wealth of results for the limits to efficiency imposed by the incompleteness of contracts, information asymmetries etc. in controlling bureaucrats.

It would perhaps be best to downsize an office that has become too large. However, this may not be feasible, partly because it is difficult to judge from the outside whether or not it is too large. It could be, for instance, that the only evidence the principal can observe is that the administrators are hard working, while, for a variety of possible reasons, these administrators themselves do not want the office to be downsized. In this case, the latter will naturally define the tasks and procedures of the office in such a way that the time available is filled. Administrators could use up the time with internal procedures, such as writing and circulating memos and approving them. The excess staff may also be used for interaction with the clients. This may, but need not, be to the benefit of clients. Service for the clients may be improved, for instance, by increasing the number of counters where they are served and this could reduce waiting time. In addition, the administrator could become more diligent and could spend more time on reading the documents. This could turn out to be to the customer's disadvantage because waiting time would increase. Furthermore, administrators could divide up the task of servicing a particular client into several sub-tasks, thus ensuring that clients deal with a number of administrators instead of one. Each of these would have to become familiar with the particular case in order to contribute something to finishing it. This procedure also creates the need for more supervision within the office. A hierarchical structure may be needed to coordinate this process and it will require some effort to evaluate and optimize it.

The purpose of this paper is to see Parkinson's theory at work. Therefore, we had to identify a bureaucratic setting with a clear one-dimensional output with measurable quality. As bureaucracies are mostly complex and highly integrated organizations this was very difficult. So we are especially glad that we could detect a setting that serves as an unique laboratory to test Parkinson's ideas. We compare about 400 German motor vehicle registration offices and consider whether more staff will improve the quality of the public service or make it deteriorate. These local offices have a simple one-dimensional task that allows service quality to be measured, this is the time it takes for a client to register a car. We collected the relevant data in a survey and the following are the key findings of a multivariate analysis. First, there is considerable variance with respect to both the ratio between the number of staff available and the number of clients served and also with respect to the average time needed to complete cases. However, the service time is no shorter in offices where there was more staff per case. Second, if processing the cases of single clients is more disaggregated, there is a tendency for average duration to increase. Third, the staff-per-case-ratio in the registration offices increases more than proportionally with the number of cases.

There are a number of other studies on Parkinson's ideas. Behavioral scientists have studied extensively the relationship between time available and the time needed to complete a task.[1] Brannon, Hershberger and Brock (1999) provide a literature survey suggesting that Parkinson's law is widely, but not unanimously, accepted among sociologists and in the organizational behavior and management literature. They also provide new experimental evidence that is in line with the law. Moss (1978) used data from the Natural Environment Research Council's (NERC) report. His data suggest that the number of administrative staff within NERC bodies is a function of total staff and the number of locations/addresses of the respective body. His result triggered further correspondence in Nature (Flux 1980, Gray 1980). In management science Gutierrez and Kouvelis (1991) took up Parkinson's time dimension aspect. They formalized and extended Parkinson's theory for project management with special regard to project completion time. Other aspects of Parkinson's law were analyzed by Breton and Wintrobe (1979, 1982). According to them, administrators maximize power by accumulating the loyalty of theirs subordinates. In times of declining budgets, the subordinates have to be promoted as a reward for their loyalty and to save them from dismissal. Budget cuts may then lower the output but lead to an increase in the administrator - subordinate proportion. This theory explains some of Parkinson's observations and McKee and Wintrobe (1993) test it. They find empirical support in the Canadian public school system and in the US steel indus-

[1] The first experiments were done by Aronson and Gerard (1966), Aronson and Landy (1967), and Bryan and Locke (1967). They all succeed in replicating Parkinson's observation. Later, Orpen and Riese (1973) failed to replicate Parkinson's results, whereas both Latham and Locke (1975) and Peters, O'Connor, Pooyan and Quick (1984) in their field studies again succeeded.

try. O'Toole, Jr., and Meier (2004) find evidence that contracting in education implies more administration there and vice versa. The analysis by Boyne (2003) concludes that the most likely ways of improving the service are to provide extra resources and better management. This finding is in contrast with our findings, where more resources seem to have no influence on service quality.

The paper is organized as follows. In section 2 we provide information on the institutional background of our setting. In Section 3 we review Parkinson's ideas and formulate three empirical hypotheses which we test in section 4. In Subsection 4.1 we describe the data set. The empirical model and estimation methods are presented in Subsection 4.2. Results are given and explained in Subsection 4.3. Section 5 offers some concluding remarks.

2 Institutional Framework

Input and output of bureaucracies is generally multi-dimensional. On the one hand, differences in wage structures, regional or local legislation, and technological endowment can result in heterogenous input. On the other hand, most offices, especially in the Anglo Saxon world, offer more than one service to their customers. Thus their output is not one-dimensional and may be difficult to measure.

Where both inputs and outputs differ in more than one aspect, it is hardly possible to measure their efficiency. However, we were able to identify a bureaucracy that provides a service whose efficiency is easy to measure because, although there are several input dimensions, there is only one output dimension. This is the processing of motor vehicle registrations in Germany.

There is a uniform pattern for car registration. All departments carry out the same task under comparable technological constraints and under very similar administrative wage regimes. All cars and all car owners must be registered. Federal law is applied in all local administrative districts. The offices produce only one product that is fully standardized countrywide: car registration. Product quality differs among offices along one output dimension only. This is the time required for a car to be registered or, put differently, the time it takes a customer from entering the office to leaving it can differ widely. This is the one and only output dimension that creates the quality differences between offices.

Within the common legal and wage structure framework the local administrative districts themselves organize the registration process and structure the offices. There is, therefore, considerable variation with several important input dimensions. These are the number of employees and their full-time equivalents per car registration, the overall size of the local office, the way the office is organized in terms of one-stop versus several-stop agencies. There is, also, considerable variation in the average time it takes a client to register a car, which is, as mentioned above, the measure of output quality for this public service.[2]

Thus, the bureaucratic setting of the vehicle registration process in Germany offers a rare opportunity to measure efficiency in a bureaucracy and, hence to test Parkinson's law.

3 Distilling Parkinson's ideas

50 years ago, C. Northcote Parkinson published his book "Parkinson's Law and Other Studies in Administration". It describes the time consumption and development of size in a bureaucracy. Parkinson noted that work expands to fill the time available for its completion and stated this as follows (1957, 2).

> Granted that work (and especially paperwork) is thus elastic in its demand on time, it is manifest that there need be little or no relationship between the work to be done and the size of the staff to which it might be assigned.

He illustrated his findings by comparing the amount of time an old lady might need to write and send a postcard with the amount a busy manager might need. The lady can spend a whole day getting nicely dressed, looking in various shops for a suitable card,

[2] We use service quality, service time, waiting time, and duration as synonyms. We always mean the time from entering the office building to leaving it, i.e. the sum of pure waiting and service times.

writing it in a pleasant café, and taking it to the post office, but the manager only needs a few minutes to write and send off his card. According to Parkinson (1957, 2) the reason is that "[t]he thing to be done swells in importance and complexity in a direct ratio with the time to be spent".

All other things equal, additional staff adds time to the overall time budget of the bureau. Consequently, all employees have more time to complete the work to be done. So if, in our context, additional staff is employed, all staff members have more time for a given number of car registrations in a certain period of time. However, we do not know how more staff will affect service quality. This depends on what tasks the new staff are given. Following a theory based on efficiency, a rise in service quality could be expected to follow the increase in staff. Remember, that service quality is measured by the time a client needs to register a new car. So, the shorter the time required, the higher product or service quality.

However, employees can also be kept busy inefficiently or they can keep themselves busy inefficiently. The administrators may, for instance, think up additional procedures for dealing with their clients, ask clients to provide additional paperwork, formal documents, or to fill in excessively long forms. This may also serve the purpose of using up administrators' time, as these forms must be read and processed, documentation needs to be inspected and photocopied etc. This can result in no change in service quality or, in the worst case, in a decline in service quality. Parkinson observed that the work to be done increases in a direct ratio with the available time (Parkinson, 1957, 2). As a consequence, the number of registrations one staff member handles, i.e. the registration-staff-ratio, should have no influence at all on service time, because the additional time each employee gains from an increase of staff given the number of registrations is simply used to extend the time needed for one car registration. Therefore, the first hypothesis can be derived.

Hypothesis 1 *The registration-staff-ratio has no influence on the average duration of each single registration service.*

Still, from a Parkinson point of view, this is not the only relevant aspect. How many administrators are involved in one registration is also important, because "officials make work for each other" (Parkinson, 1957, 4). A question, for example, may well come to two administrators and they might argue about who is to be in charge of it. Possibly one of them may draft an answer and the other read, amend and correct it carefully - using more time than he would have needed to answer it on his own. Even if tasks are clearly allocated - as is probable in car registration offices - each administrator has to be familiarized with each case. The more disaggregated the organization of the car registration process, the more administrators must become acquainted with each single case. Furthermore, each (additional) administrator adds administrative work, because he makes the lines of communication longer and also needs to be supervised. Consequently, the overall waiting time for the customer will be longer the more employees that are involved, i.e. the more disaggregated the organization of the process.

Hypothesis 2 *The larger the number of administrators involved in each single registration process, the longer the waiting time.*

As is known from the queueing theory, based in the field of operations research, waiting time, which can - as in our setting - include real waiting time plus service time, depends on the mean service rate, the mean arrival rate of the customers and the number of service points[3]. According to the queueing theory waiting time should, ceteris paribus, decrease with the number of service points. If, during a day, 100 arbitrarily distributed customers appear and are served at one service point, average waiting time (and average idle time) will be longer than if 1,000 arbitrarily distributed customers appear and are served at 10 service points. This becomes intuitively clear if one considers, for example, the possibility that one customer poses many questions to the administrator and, as a consequence, needs much more time to be served than the average customer. In the second scenario, were 1000 customers appear over the day, this customer will cause hardly any additional waiting time because the following customers can be served within average waiting time at the remaining nine service points. And the probability that 10 customers with many questions in mind arrive at the same time, block all service points and cause longer waiting

[3] For a detailed description of the relationship of these three aspects in a multi-server case see for example Hillier and Lieberman (1980, 400-424).

times is far smaller than that one of these customers arrives in the first scenario, blocks the one and only service point and causes longer waiting times for all following customers. We consider these theoretical aspects in our estimations of the hypotheses 1 and 2, too.

Parkinson also noted that administrators are bound to multiply because "an official wants to multiply subordinates, not rivals." (Parkinson, 1957, 4). An administrator who considers herself overworked will probably insist on having two assistants to help her. If she divides the work between them, she will benefit from being the only one who comprehends them both because each of them only knows one aspect of the task to be carried out. It is important to notice that there have to be at least two subordinates. If there was only one assistant he would try to divide the work between himself and the administrator. Then, the assistant would almost assume an equal status to the administrator which is not in the interest of the former because the administrator does not want to have a rival. The administrator does not want to risk loosing her job to the assistant if it turns out that he is doing a better job than she is doing herself. However, if the administrator has at least two assistants, there clearly is a hierarchical order between the administrator and the assistants and a direct comparison between the work of the administrator and that of the assistants becomes far more difficult. Then, the position of the administrator is not at risk. Thus, subordinates must number two or more. A bureaucracy tries to keep itself busy so, at one point, the new assistant, will complain that he is overworked and ask for assistance himself. To be fair, all new employees will have to have assistants and so on (Parkinson, 1957,4-5). Hence, over time, organizations increase their administrative staff relative to other employees regardless of whether or not the administration carries out additional tasks. A hierarchy emerges. In a strong version, the administrative staff can multiply even when output and the number of other employees both decline, as can be seen from the way the British Navy developed after the First World War (Parkinson, 1957, 7-13).

It should be expected that the overall staff of a vehicle registration office will increase with the number of cases to be handled. However, if Parkinson's law holds, each increase in the number of cases handled should be followed by a disproportionately large increase in overall staff numbers because an administrative hierarchy builds up.

Hypothesis 3 *The number of employees grows disproportionately with the number of cases.*

4 Empirical Evidence

4.1 Data

In order to assess the role of office and staff size, and of the internal structure of the office for the service quality, we sent a questionnaire to all 447 main vehicle registration offices in Germany in May 2004. 235 questionnaires were returned and could be used for the analysis. This is a share of 53 per cent.

The questionnaire included questions about the tasks of the admission office, its staff (number of people and their full-time-employee-equivalents), the number of counters and waiting room seats, the internal structure of the registration process for a new car and the average length of time taken for a new vehicle registration from entering the building until leaving it. We asked for annual data for the year 2003.

Our data have both strengths and weaknesses. Certainly, the high feedback rate for our questionnaires (53 per cent) is very positive. Moreover, the questionnaires were completed carefully and we have very few missing answers to specific questions. Admittedly there is one main shortcoming in the data, it is that they are based on self-assessments and with such assessments it is always possible for the data to be manipulated strategically. Each of the offices may have an incentive to claim that the waiting times are shorter than they really are and thus appear to be providing better service. However, we have no reason to believe that this incentive differs between offices. So a strategic incentive for all offices to downsize waiting time by, e.g., 10 per cent should not cause a bias.

Overall annual registrations, address and ownership changes, and deletions of registrations at the local level (*Kreise*) were obtained from the Federal Vehicle Office (*Kraftfahrzeugbundesamt*). This also provided information about the branches of registration offices. The Federal Statistical Office (*Statistisches Bundesamt*) provided us with annual data for local GDP and population.

4.2 Empirical model

Whereas hypotheses 1 and 2 offer explanations for waiting time, hypothesis 3 attempts to explain the size of offices' staff. So, we have two different dependent variables and, therefore, carried out two separate regression analyses. Let us begin with the first two hypotheses.

In the empirical literature, there are two ways of estimating waiting time. Lindsay and Feigenbaum (1984) and Midttun and Martinussen (2005) both use ordinary least squares (OLS), while Joling/Groot/Janssen (2003), for example, estimate waiting time for doctors using a proportional hazard model. The latter method especially fits well with our findings from the queueing theory, which imply a non-linear explanation for the waiting time. Therefore, we estimate our hypotheses using OLS and control the results with a proportional hazard model. We use the following empirical model for both estimation methods

$$d_i = \beta_0 + \beta_1' x_i + \beta_2' z_i + \beta_3' s_i + \epsilon_i. \tag{1}$$

The independent variable d_i denotes the average time needed to register a new vehicle from entering the office until leaving it in minutes (DURATION), i.e. the waiting time plus the service time. Our unit of observation is the local jurisdiction $i = 1, ..., N$.

The bureaucracy variables, that simulate the mean service rate of the queueing theory, are summarized in x_i. These include the registration-staff-ratio (REGISTR_FTE), i.e. the ratio of new vehicle registrations to full time employee-equivalents, and the officers involved in each registration process (ADMIN). These two variables are the most important explanatory variables for hypotheses 1 and 2. However, further variables simulate the mean service rate and are, therefore, included in x_i. These are the annual cases handled in one office (CASES), additional duties the office has to carry out (TASK), and the hierarchical position of the office (INDEPEND) within the German administration. The variable CASES consists of new vehicle registrations, changes in address or ownership and deletions of registrations. Additional duties are those that go beyond the ones given in the federal legislation for registration offices. The variable INDEPEND measures whether the local office can act relatively independently of supervising authorities or not. It is a dummy variable which takes the value 1 if the office is highly dependent on a supervising authority and 0 otherwise. We also include the convenience of waiting by using the relative number of waiting room seats (SEATS_CASES) and the relation between employees and their full time equivalents (FTQ). As not all employees work full time, the number of employees exceeds the number of full time equivalents. Finally, we control for the number of branches the office might have (BRANCH). A detailed description of all the variables can be seen in Table 1.

[Table 1 about here]

An approximation of the mean arrival rate can be seen in the variables that refer to different characteristics of the local jurisdictions, such as variations in GDP or case density. The number of cases per capita (CASES_PERS) or local GDP per capita (GDP_PERS) in each local jurisdiction are denoted in z_i. We also control for whether large car companies that might register many new cars are located in the local jurisdiction (CarProd) and a dummy for each state is included to control for state effects. This is also denoted in z_i.

Following the queueing theory, we further include the number of service points (COUNTER) and an interaction variable (INTERACTION) where the number of counters interacts with the new-registration-to-counter ratio in s_i. This nonlinear variable is well in line with the nonlinear relation between office size and the number of counters derived from queueing theory.

Random disturbance is $\epsilon_i \sim N(0, \sigma_\epsilon^2)$. Let $w_i = (x_i|z_i|s_i)$, then the assumptions of the model can be summarized as follows

$$E(\epsilon_i \epsilon_j) = 0 \qquad \text{for } i \neq j$$

$$E(w_i \epsilon_j) = 0 \qquad \text{for all } i, j \tag{2}$$

We use OLS and control for heteroskedasticity using corrected standard errors. To complement the use of state dummies, we cluster states where the assumption of independence of observations within states is relaxed. So, clustering produces "correct" standard errors (in the measurement sense) as, even if the observations within the cluster are correlated, they only have to be independent across clusters. Finally, we control for outliers.[4]

As it is most likely that all explanatory variables enter in a nonlinear way to determine waiting time, we check our results obtained by the linear regression with a non-linear regression using a duration model, i.e. the fit proportional hazards model. The hazard function describes the probability that the waiting time will be over in T, given the fact that the person has waited until then. In our setting the hazard function is constant which means that the process driving T is memoryless, i.e., the probability of exit in the next interval does not depend on how much time has been spent in the initial state (Wooldridge, 2002, 688). We also control for heteroskedasticity with corrected standard errors.

The general setting changes slightly when hypothesis 3 is estimated, because, instead of the waiting time, the bureaucratic structure of vehicle registration offices is analyzed. Then, the empirical model looks as follows:

$$m_i = \beta_0 + \beta_1' x_i + \beta_2' z_i + \beta_3' s_i + \beta_4' d_i + \epsilon_i. \tag{3}$$

Now, the dependent variable m_i is the the ratio of annual cases to full time employee-equivalents (CASES_FTE). The bureaucratic variables in x_i remain unchanged with one exception. The variable REGISTR_FTE is no longer included as it is almost perfectly correlated with the dependent variable m_i. As in equation 1, z_i denotes local control variables like CarProd and local GDP per capita. The case density (CASES_PERS) is not included because it would - in the end - only measure the relationship between local inhabitants and full-time equivalents and this does not play a role in our setting. s_i is defined slightly differently. Instead of the interaction variable and the total number of counters, we include the number of counters relative to cases (CASES_COUNTER) as we have no reason to believe that counters should enter the regression in a nonlinear way. Finally, the variable d_i denotes, again, service time.

As before, random disturbance is $\epsilon_i \sim N(0, \sigma_\epsilon^2)$, all other assumptions are analogous.

[4] We eliminate outliers with Cooks'D larger than 1 before estimating robust standard errors. In this case, however, no clustering is possible.

We estimate equation 3 with OLS and use the same control tools as described above.

4.3 Empirical Results

Before we estimate the hypotheses let us first take a brief look at the descriptives.

[Table 2 about here]

The average registration time for a new car is half an hour. However, the actual time given differs widely, between 5 and 165 minutes. The sizes of the registration offices are very different as can be seen from the number of yearly car registrations (between 1,558 and 104,646) and the annual cases they handle, ranging from 6,868 to 421,690 with an average of 32,658 cases. The variation in size can also be seen from the number of full-time equivalents working there. These vary between 2 and 296 (average 16.3).

On average, one full-time employee-equivalent registered 520 cars per year (REGISTR_FTE). This falls to 489 if the seven local jurisdictions where large car production sites are located (CarProd) are excluded (REGISTR_FTE_E). Again, there is a wide interval, ranging from 172 car registrations per full time equivalent to 3,066 (or to 2,021 without jurisdictions with large car production sites). 2.1 administrators were, on average, involved in each registration process, with a minimum of one, and a maximum of 20, officers (ADMIN).

Whereas 70 per cent of offices had no branches, 21 per cent had one and the rest had two or more (BRANCH). 80 percent of offices did not carry out more tasks than required in the Federal Law for registration offices. 9 per cent carried out one additional task, 7 percent two, and the remainder carried out more of them (TASK). While two third of offices are subordinate to another administrative body and are, therefore, relatively dependent, one third is not (INDEPEND). The employees worked, on average, 84 per cent of the full time work load (FTQ).

Looking at GDP per capita and case density in each local jurisdiction, we find that average GDP per capita is 24.561 €, and 18 per cent of inhabitants had a registration, a deletion or a change of address or ownership of a car during the year. This result remains unchanged when the seven local jurisdictions with large car production sites are excluded.

Finally, the number of available counters (COUNTER) varies between 1 and 5, with the absolute majority of offices (52 per cent) having 2 counters. The ratio of registrations to counters (REGISTR_COUNTER) varies between 622 and 48.006 per year with an average of 4.724.

In section 3 we developed two hypotheses to explain the waiting time for a car registration in Germany. According to the first, the *registration-staff-ratio has no influence on the duration of the registration process.* In our estimations we specified staff with full time equivalents. The results are presented in table 3.

[Table 3 about here]

In column 2 we report the results from the OLS-estimation with robust standard errors and clustered states (estimation 1), and in column 3 the results from the OLS-regression with robust standard errors corrected for outliers (estimation 2). In the last column we show the estimation results from a proportional hazard model (estimation 3). In estimation 1 and 2, the coefficient of the variable REGISTR_FTE is slightly positive. So if the number of full-time-equivalents increases the value of the variable REGISTR_FTE decreases and waiting time declines. The corresponding coefficient in the last column is negative. In a proportional hazard model, this negative coefficient shows that the probability that, at a given point of time, someone is no longer waiting is higher, the higher the registration-staff-ratio (REGISTR_FTE); i.e. - again - the fewer registrations a full time equivalent has to handle, the shorter the waiting time. However, all three coefficients are extremely small, and - even more important - well below any acceptable significance level. Thus, we find support for hypothesis 1.

The second hypothesis derived in section 3 predicts that *the more administrators are involved in the registration process, the longer is the waiting time.* The results are also reported in table 3. We find a very strong positive relationship between the number of employees involved in one registration process (ADMIN) and the duration of the process in all three estimations. The OLS-estimations produce a coefficient of 1.8 and 2.0, respectively. That means that one additional employee who is involved in the registration process adds around two minutes waiting time for every customer. These results are significant at a 1-per cent-level, whereas the coefficient in the proportional hazard model is still significant at 5 per cent. As described before, the coefficient in the proportional hazard model has a sign opposite to that of the OLS-results, i.e. it is negative. The interpretation is the same as mentioned above: the more administrators are involved in one registration process, the lower the probability that, at a given point of time, someone has already been served, i.e., the longer the waiting time. Thus, we find support for hypothesis 2, too.[5]

Most of the coefficients of the control variables show the expected sign but none of them is even close to being significant.[6]

We did not report the coefficients for state dummies. In the OLS-regressions no single state dummy is ever significant. However, they are jointly significant. Therefore, it is important to include them. In estimation 3, the proportional hazard model, four state dummies are significant and if tested jointly all are significant. As the coefficients have negative signs, the waiting time in Bavaria, Baden-Württemberg, Saarland, and Lower Saxonia appears to be longer than elsewhere. The first three coefficients are significant at a 1% level and the last one is still significant at a 10%-level.

In section 3 we also derived a hypothesis for Parkinson's idea that organizations are bound to multiply the number of subordinates. Hypothesis 3 says that *the number of employees grows disproportionately with the number of cases.*

[Table 4 about here]

In table 4 we show the results of a robust OLS-estimation that controls for outliers. The coefficient of cases (CASES) shows a negative sign, so if the number of cases increases, the ratio of cases to full time equivalents (CASES_FTE) decreases. That means that the number of full time equivalents must increase relatively more than the number

[5] If we run regression 1, 2, and 3 without the highly significant variable ADMIN, the other main results do not change.

[6] There is one exception. In estimation 3 the coefficient of INDEPEND is significant at the 10 per cent level. The negative coefficient shows that waiting time is longer if the admission office is subordinated to another administrative body. From a more general point of view this could be seen as evidence for promoting a more decentralized organization.

of cases. The result is significant at 1 per cent. This disproportional increase in the staff size is exactly what our hypothesis 3 predicts because administrators multiply their subordinates. And if there are more administrators in the first place, because we have a large registration office handling many cases, there must be even more subordinates because the former built up a hierarchy. Therefore, the overall number of employees increases disproportionately with office size.

Five coefficients of control variables are significant and will be discussed briefly. Not surprisingly, the coefficient of the variable accounting for additional tasks a registration office carries out (TASK) has a negative sign. The more additional tasks a registration office carries out, the fewer registration cases per full-time equivalent occur because employees also have other duties. This result is significant at 5 per cent. We control for comfort by looking at the ratio between waiting room seats and cases (SEATS_CASES). The coefficient of this variable shows the expected negative sign and the variable is highly significant. So, if the number of waiting room seats increases, so too does the number of full-time equivalent employees. As waiting room seats are highly correlated with office size, this correlation simply means that there are more full-time equivalents in large offices. The next significant control variable is the ratio of full-time equivalents to employees in absolute numbers (FTQ). It has a negative sign, meaning that there is a positive relation between the absolute number of employees and number of cases. As expected, the coefficient of the variable controlling for large production sites (CarProd) has a positive sign and significance is at the 1 percent level. In local jurisdictions where there is a large car production site, the number of annual car registrations is much higher than elsewhere. However, the number of full-time equivalents dealing with these registrations does not have to be increased proportionately as the registration process in this context is probably highly automated. Finally, the ratio of cases to counters (CASES_COUNTER) shows a significant positive correlation with case-to-full-time-equivalents. This means that the number of full-time equivalents increases with the number of counters. It is most probable that this is simply an indication for office size. The number of administrators handling a registration (ADMIN), the number of branches (BRANCH), local wealth (GDP_PERS) and waiting time (DURATION) have insignificant coefficients.[7]

In estimation 4, state dummies are not included because none of them is significant and they are also not significant if tested jointly. So, states do not seem to play a role in this question.[8]

Summing up, we also find support for the hypothesis that the staff size increases disproportionately with the size of the registration office.

5 Conclusion

Our results are well in line with Parkinson's law in three aspects. First, following Parkinson's observation that paperwork is elastic in its demand for time and expands with the time available, we do not find any correlation between staff-per-registration-ratio and waiting time. So the bureaucrat's extra time is not used to the benefit of the customer, and this means that service quality is no better in offices that have more staff per registration. As an increase in staff does not improve service quality, one has to think of other aspects.

Second, waiting time increases with the number of administrators involved in the registration process. Thus, service quality is worse if the service procedure is disaggregated into multiple smaller sub-services. This confirms Parkinson's findings that the bureaucracy keeps itself busy because each additional employee adds to administrative work.

Finally, an increase in the number of clients who are served causes a more than proportionate increase in staff size. This supports Parkinson's law that the number of administrators is sure to multiply since they want to increase the number of their assistants, with the result that an administrative hierarchy emerges.

Our findings also point to the principal-agent-problem and stress the importance of incentive based work contracts. Apparently, bureaucrats do not tend to work output

[7] All results remain unchanged if waiting time is not used as an explanatory variable in the estimations. However, the CASES_COUNTER coefficent is no longer sifnificant.

[8] By the way, if we include state dummies the result does not change, but significance of our main explanatory variable, decreases somewhat (available upon request).

oriented. (Financial) incentives as well as motivation might be more important tools to increase efficiency than a simple increase of staff or disaggregation of tasks.

6 References

References

[1] Aronson, Elliot and Eugene Gerard, 1966, Brief Articles Beyond Parkinson's Law: The Effect of Excess Time on Subsequent Performance, *Journal of Personality and Social Psychology* 3(3), 336-339.

[2] Aronson, Elliot and David Landy, 1967, Further Steps Beyond Parkinson's Law: A Replication and Extension of the Excess Time Effect, *Journal of Experimental Social Psychology* 3, 274-285.

[3] Boyne, George A., 2003, Sources of Public Improvement: A Critical Review and Research Agenda, *Journal of Public Administration Research and Theory*, 13(3), 367-394.

[4] Brannon, Laura A., Paul J. Hershberger and Timothy C. Brock, 1999, Timeless demonstrations of Parkinson's first law, *Psychonomic Bulletin & Review* 6(1), 148-156.

[5] Breton, Albert and Ronald Wintrobe, 1979, Bureaucracy and state intervention: Parkinson's Law?, *Canadian Journal of Public Administration* 2, 208-225.

[6] Breton, Albert and Ronald Wintrobe, 1982, *The logic of bureaucratic conduct: An economic analysis of competition, exchange, and efficiency in private and public organizations*, Cambridge: Cambridge University Press.

[7] Bryan, Judith F. and Edwin A. Locke, 1967, Parkinson's Law as a Goal-Setting Phenomenon, *Organizational Behavior and Human Performance* 2, 258-275.

[8] Flux, John E. C., 1980, Parkinson's trees, *Nature* 285, Issue 5764, 354.

[9] Gray, B.M., 1980, Parkinsonian exasperation, *Nature* 285, Issue 5763, 282.

[10] Gutierrez, Genaro J. and Panagiotis Kouvelis, 1991, Parkinson's Law and Its Implications for Project Management, *Management Science* 37(8), 990-1001.

[11] Hillier, Frederick S., and Gerald J. Liebermann, 1980, *Introduction to Operations Research*, 3rd edition, San Francisco, Holden-Day.

[12] Joling, Catelijne, Wim Groot and Peter P.M. Janssen, 2003, Waiting for the Doctor: Gender Differences in the Timing of an Intervention by the Occupational Physician, *Journal of Occupational Rehabilitation* 13(1), 45-61.

[13] Laffont, Jean-Jaques, and Jean Tirole, 1993, *A Theory of Incentives in Procurement and Regulation*, MIT Press, Cambridge, MA.

[14] Latham, Gary P. and Edwin A. Locke, 1975, Increasing Productivity with Decreasing Time Limits: A Field Replication of Parkinson's Law, *Journal of Applied Psychology* 60(4), 524-526.

[15] Leibenstein, Harvey, 1966, Allocative Efficiency vs. "X-Efficiency", *American Economic Review*, 56(3), 392-415.

[16] Leibenstein, Harvey, 1978, On the Basic Proposition of X-Efficiency Theory, *American Economic Review*, 68(2), 328-332.

[17] Lindsay, Cotton M. and Bernard Feigenbaum, 1984, Rationing by Waiting Lists, *American Economic Review* 74(3), 404-417.

[18] McKee, Michael and Ronald Wintrobe, 1993, The decline of organizations and the rise of administrators: Parkinson's Law in theory and practice, *Journal of Public Economics* 51, 309-327.

[19] Midttun, Linda and Pal E. Martinussen, 2005, Hospital waiting time in Norway: What is the role of organizational change?, *Scandinavian Journal of Public Health* 33(6), 439-446.

[20] Moss, Robert, 1978, An empirical test of Parkinson's Law, *Nature* 273, Issue 5659, 184.

[21] Niskanen, W.A., 1971, *Bureaucracy and Representative Government*, Chicago and New York, Aldine Atherton.

[22] Orpen, Christopher and Edward Riese, 1973, Beyond Parkinson's Law: A Failure to Replicate, *The Journal of Social Psychology* 89, 151-152.

[23] O'Toole, Laurence J. Jr. and Kenneth J. Meier, 2004, Parkinson's Law and the New Public Management? Contracting Determinants and Service-Quality Consequences in Public Education, *Public Administration Review* 64(3), 342-352.

[24] Parkinson, Northcote C., 1957, *Parkinson's Law and other Studies in Administration*, Houghton Mifflin Company, Boston.

[25] Peters, Lawrence H., Edward J. O'Connor, Abdullah Pooyan and James C. Quick, 1984, The Relationship between Time Pressure and Performance: A Field Test of Parkinson's Law, *Journal of Occupational Behaviour* 5(4), 293-299.

[26] Wooldridge, Jeffrey M., 2002, *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, MA.

[27] Wyckhoff, Paul Gary, 1990, Bureaucracy, inefficiency, and time, Public Choice 67, 169-179.

7 Appendix

Variable	Explanation
DURATION	waiting and service time for a new vehicle registration in minutes
REGISTR	annual registrations of new vehicles per office
FTE	full-time employee eqivalents, i.e. hypothetic staff size if all employees worked full time
REGISTR_FTE	ratio new vehicle registrations (REGISTR) to full-time equivalents (FTE)
ADMIN	administrators involved in each registration process
CASES	annual cases = registrations, adress and ownership changes and deletions
BRANCH	number of branches of a registration office
TASK	additional administrative tasks the office carries out
INDEPEND	= 1 if registration office is subordinated to another administrative body
FTQ	ratio of full-time employee equivalents to absolute number of employees
SEATS_CASES	ratio of waiting room seats to cases
CarProd	= 1 if a large car production site is located in the local jurisdiction
GDP_PERS	GDP per capita in each local jurisdiction
CASES_PERS	cases per capita in each local jurisdiction
CASES_FTE	cases per full-time equivalent
COUNTER	service points or counters
REGISTR_COUNTER	ratio of new registrations to counters
INTERACTION	COUNTER* REGISTR_COUNTER
REGISTR_FTE_E	REGISTR_FTE without CarProd = 1

Table 1: Explanation of variables.

Variable	N	mean	s.d.	min	max
DURATION	233	30.3	18.7	5	165
REGISTR	235	8295.6	11500.5	1558	104646
FTE	232	16.3	22.9	2	296
REGISTR_FTE	232	519.6	302.6	172.3	3065.9
REGISTR_FTE_E	225	488.8	213.6	172.3	2021.0
ADMIN	234	2.1	1.35	1	20
CASES	235	32657.9	36685.6	6868	421690
CASES_FTE	232	2171.7	900.4	747.3	9899
BRANCH	235	.4298	.7668	0	4
TASK	235	.4085	.9355	0	6
INDEPEND	228	.6579	.4755	0	1
FTQ	232	.8406	.1234	.25	1
CarProd	235	.0298	.1704	0	1
GDP_PERS	235	24561.1	11418.6	6290.4	78018.2
CASES_PERS	235	.1849	.0339	.0428	.4418
COUNTER	235	1.8809	.7586	1	5
REGISTR_COUNTER	235	4724.1	5608.9	621.7	48005.5

Table 2: Descriptive statistics.

Variable	estimation 1		estimation 2		estimation 3	
REGISTR_FTE	.0016	(.0038)	.0049	(.0054)	−.0002	(.0002)
ADMIN	1.8333***	(.5616)	1.9719***	(.6937)	−.0768**	(.0364)
CASES	.0000	(.0002)	−.0000	(.0002)	−.0000	(.0000)
BRANCH	−.5436	(1.4933)	−1.5431	(1.3909)	.02	(.0662)
TASK	.7626	(1.5135)	−.7994	(1.029)	−.0656	(.0963)
INDEPEND	2.5975	(2.0557)	.8541	(2.026)	−.1942*	(.1087)
SEATS_CASES	−106.6207	(2347.904)	−689.0284	(1598.14)	−32.3941	(105.9645)
FTQ	3.7478	(12.3207)	2.9055	(9.5194)	−.0546	(.7248)
CarProd	-12.1807	(10.2533)	-9.5716	(10.4005)	.4852	(.5027)
GDP_PERS	.0002	(.0001)	.0001	(.0001)	−.0000	(.0000)
CASES_PERS	11.7014	(52.9191)	-26.4803	(46.9778)	-.8814	(2.8270)
COUNTER	-1.4402	(1.2122)	-1.3734	(1.438)	.0856	(.0673)
INTERACTION	.0001	(.0005)	.0002	(.0005)	.0000	(.0000)
R^2	.2187					
F (27, 191)			2,60			
LR-Test $X^2(27)$					35,53	

Dependent variable for all three estimations: DURATION, $N = 219$, robust standard errors in brackets.
Significance levels: *** = 0.01, ** = 0.05, * = 0.10

Table 3: Regression results for registration duration.

Variable	estimation 4	
CASES	-.0043***	(.0016)
ADMIN	-12.0415	(20.0822)
BRANCH	-24.0495	(40.0568)
TASK	-73.4569**	(30.7992)
INDEPEND	4.3267	(60.0235)
SEATS_CASES	-145768.7***	(45213.83)
FTQ	-2552.379***	(233.4117)
CarProd	698.3915***	(179.0319)
GDP_PERS	-.0005	(.0026)
CASES_COUNTER	.007**	(.0029)
DURATION	-2.0776	(1.8032)
F (11, 207)	18.09	

Dependent variable CASES_FTE, $N = 219$,
robust standard errors in brackets.
Significance levels: *** = 0.01, ** = 0.05, * =0,10

Table 4: Regression results for office size.

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