

# Vertical transfers and the appropriation of resources by the bureaucracy: the case of Brazilian state governments

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**Abstract** The purpose of this study is to explore whether the transfers received by state governments in Brazil are being appropriated by the bureaucracy as wages. The wage differential between the public and private sectors was used as a measure of this appropriation, following the technique for wage decomposition proposed by Oaxaca. Our results show that transfers stimulate appropriation by the bureaucracy, but that private groups existing within the states contend for these resources. The results also indicate that the resources appropriated are distributed uniformly between the various groups composing the bureaucracy.

**Keywords** Intergovernmental grants · Bureaucracy · Appropriation · Public-private wage differential

**JEL Classification** H71 · H77

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## 1 Introduction

Since Brazilian states are highly dependent on federal transfers,<sup>1</sup> and the amount spent on wages relative to total expenditure is high,<sup>2</sup> it is suspected that these transfers are sustaining a system of resource appropriation by the bureaucracy.

Two initial problems need to be faced when dealing with this question. First, there is a measurement problem. Not all resources spent on wages represent an appropriation. Therefore, it is certain that a part of these expenses remunerates services that are actually supplied.<sup>3</sup> Second, the literature dealing with transfers highlights the possibility of reverse causality in this relationship.<sup>4</sup> Even though the transferred funds come from the federal government, the choice to finance the supply of services or enable the resources to be appropriated by the bureaucracy may be a decision that falls within the jurisdiction of state governments. Thus, we have chosen to measure the appropriation of resources by the public-private sector wage differential and to consider only one direction of causality for the transfers (from the federal government to the states).<sup>5</sup>

We understand that the most accurate measure of the appropriation of resources by the bureaucracy is the wage differential, even considering that there is the theoretical possibility of the public wage premium serving as an effective policy to fight corruption (Becker and Stigler 1974). It is very difficult to justify the use of a salary premium for two reasons. First, governments own other instruments to fight corruption. Second, the fight against a high degree of corruption could demand a much larger budget.<sup>6,7</sup> In addition, the direct measurement of the differential developed by Calvo and Murillo (2004) to measure “patronage” in Argentina may not be the most correct, given that the authors did not control the observable characteristics of the different groups. In this case, the technique of decomposition of wages developed by Oaxaca (1973) is very useful. This technique has been widely used in labor market studies. Its adoption enables removing the observable characteristics of the investigated groups (education, experience, gender, etc.) from the wage differential.<sup>8</sup>

On the other hand, there is only causality in determining the transfers in Brazil since there are no individual lobbying efforts to redistribute or increase the resources for transfer.

<sup>1</sup>Constitutional transfers represented, on average, 60% of total revenue in the poorer states and 30% in the richer states between 1985 and 1994. Data are available from the Institute of Applied Economical Research (IPEADATA).

<sup>2</sup>Between 1985 and 1994, the average was 77.7%. Data are available from IPEADATA.

<sup>3</sup>The service sector is labor-intensive.

<sup>4</sup>There is a vast literature dealing with the return and effect of individual actions on the “common pool” of resources that make up the transfers (Alperovich 1984; Grossman 1994; Pereira 1996; Lowry and Potoski 2004; Johansson 2003; Borck and Owings 2003; Pinho and Veiga 2005).

<sup>5</sup>The institutional history between these entities does not present any reverse causality.

<sup>6</sup>Becker and Stigler’s (1974) model shows two other instruments to fight corruption beyond the premium of salaries: the probability of detection and self penalty. Governments can, for instance, perform audits more efficiently and change the probability of detection. Moreover, the application of penalty (job loss) can be higher whether accompanied by other penalties such as the return of money. We also believe that it would not be reasonable for governments to fight high levels of corruption with salary premiums. Governments must spend a higher share of the budget with this policy. It can be the case of Brazil. The country occupies an intermediary position in the ranking of corruption according to the Corruption Perception Index (Transparency International): 80th (2008).

<sup>7</sup>State-level public sector workers produced a set of laws with the aim of earning higher wages. Appendix 1 provides a short institutional explanation of the reasons justifying this assumption.

<sup>8</sup>Greene (2003, pp. 53–54) demonstrated that the wage-decomposition technique proposed by Oaxaca (1973) must be applied.

The most important transfer for the states is established in a group of laws (arising from the Constitution or complementary legislation). Moreover, the individual return from the performance of lobbyists or political groups aiming to redistribute resources differently from the way defined in laws is almost zero since changes to the legislation involve the problem of collective action. To modify the federal legislation in Brazil, a simple majority in vote is required in both congressional houses (the Senate and the House of Deputies). In the case of constitutional changes, an absolute majority (two thirds, in both cases) is necessary.<sup>9</sup>

There is no evidence that lobbyists or interest groups have managed to generate more transfers to their states in “constitutional transfers” (the most important of these is highlighted in this study). Moreover, the federal government has recently reduced the size of the “cake” to be distributed among the states.<sup>10</sup>

Considering the wage differential between the two groups as a measurement of the appropriation and causality of the transfers only in the direction of the states, it remained for us to investigate whether the transfers generated the appropriation of resources by the bureaucracy.<sup>11</sup> We test three hypotheses for this investigation. First, we test whether transfers stimulate resource appropriation by the bureaucracy. Second, we test whether private interest groups exist and fight with the bureaucracy for the appropriation of resources transferred to the states. Third, we test whether the appropriation of resources has been concentrated in some groups within the bureaucracy, or if it includes all members.<sup>12</sup>

Our results show that transfers stimulate the appropriation of resources by the bureaucracy (causing an increase in the wage differential in favor of public employees), there are private groups that dispute resources with the bureaucracy, and finally, the appropriation of these resources within the bureaucracy has been extensive, including all members of the bureaucracy.

This study is divided into six sections, including this Introduction. In the second section, we present the literature providing the basis for this investigation along with the hypotheses that will be tested. In the third section, we present the federal transfers system in Brazil, while the fourth section presents the wage differential in the states measured based on different “proxies” of labor contracts for the workers. In the fifth section, we present the empirical results and the sixth section includes our main conclusions.

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<sup>9</sup>There is a fund that is based on income transfer to municipalities with the same dimensions and objectives as those structured for the states. From what has been observed, as the resource distribution rule in this case involves the population size in each municipality, those with a decrease in population in the most recent 2000 Census (IBGE 2000) lobbied the federal government and were granted a period to adapt to their new population levels. In this case, there is evidence that this individual lobbying activity represented a gain.

<sup>10</sup>The Executive Branch in Brazil is extremely powerful (Santos 2000). It can use decrees to define rules and it has agenda power (including the possibility to fast-track the voting process and impose partial or total vetoes). It also has budgetary power since it controls the flow of payments, and it can veto part of the budget if the expenses do not have corresponding revenues to support them. Through several Constitutional Amendments since 1994 (Revised Constitutional Amendment No. 1 of 1994, Constitutional Amendment No. 10 of 1996, Constitutional Amendment No. 17 of 1989, and Constitutional Amendment No. 27 of 2000), the Executive Branch has managed to reduce the amount transferred to the states.

<sup>11</sup>Courant et al. (1979) and Dougan and Kenyon (1988) have demonstrated the distribution of transfers among groups.

<sup>12</sup>Chang et al. (2001) presented an excellent survey of the literature showing how difficult it is to understand bureaucracy because they are complex and unique. As a result, it is very difficult to build a unified and coherent theory of the bureaucracy considering its external and internal interests.

## 2 Intergovernmental grants and appropriation of resources by the bureaucracy

Courant et al. (1979) and Oates (1979) developed the idea of “fiscal illusion” to justify the increase in expenses in subnational governments when receiving resources from the federal government (*flypaper effect*). The main idea is that this kind of resource (in this case, grants) is not fully observed by the voters. The complexity of a government’s finances does not help the voters know what the true marginal costs of public goods are. Voters always suppose that grants received by the local government will be spent on public goods and, therefore, perceive that the prices of those goods are cheaper by the availability of these grants. However, this is not what happens. The subnational government (bureaucracy and politicians) exploits the misperception of voters (the costs of the service would be lower than they really are) in following its budget maximization objectives.

In this case, local government is self-motivated and is looking to maximize its own welfare rather than that of the voters it represents. Following this line of development, the next step is to investigate three hypotheses, as discussed below.

### H 1 *An intergovernmental grant stimulates the appropriation of resources by the bureaucracy.*

The seminal work of Niskanen (1971) assumed that bureaucrats are only interested in maximizing their own welfare. This is possible because there is information asymmetry between bureaucrats and their funders-sponsors (politicians). Bureaucrats have better information on the costs for supplying the product than their funders. It is clear that the bureaucracy’s power to secure a higher budget than the one desired by its funders depends on three important characteristics: (a) a supply monopoly, (b) the bureaucrat’s information about production costs, and (c) the institutional possibility for the bureaucrat to adopt a “take-it-or-leave-it” approach to the bargaining process.<sup>13</sup>

In spite of this influential contribution, the adoption of a “take-it-or-leave-it” approach to the bargaining process is more of a prerogative of funders than of bureaucrats. Funders have more tools to make bureaucrats reveal the true cost of public goods. According to Breton and Wintrobe (1975), the funders’ vulnerability in the bargaining process will define the price they will pay. This vulnerability can be observed in the funders’ demand. The more inelastic the demand of funders, the easier it is for bureaucrats to not report the true price and cost of the public goods (lowest marginal cost). The reverse occurs where demand is more elastic.<sup>14</sup> On the other hand, funders can also obtain information about the true costs, thus monitoring and punishing bureaucrat misconduct.

The interpretation of the results follows Becker and Stigler’s (1974) structure model: bureaucrats maximize the target budget considering one possible punishment. Therefore, bureaucrats are risk-averse and any additional increase in prices will result in a stricter expected penalty. Bendor et al. (1985) have shown that risk-averse bureaucrats propose a lower price than risk-neutral ones.

<sup>13</sup>The lack of a theoretical basis for this model has often been criticized. One of the critical remarks made about it is that budget maximization by the bureaucracy is not based on a utility function, but rather on empirical evidence: wages, status, and discretionary power are directly and positively derived from the size of the budget. Another critical remark is that the bilateral monopoly does not represent the relationship between the bureaucracy and its funders. See Casas-Pardo and Puchades-Navarro (2001). See also Niskanen’s (2001) version incorporating different criticisms in his development.

<sup>14</sup>Miller and Moe (1983) also considered the possibility of funders hiding their demands from bureaucrats.

Some facts lead us to believe that the state bureaucracies are carrying out this appropriation through the constitutional transfers they receive. First, the volume of the “constitutional transfers” is greater than that of discretionary (voluntary) transfers. If the Brazilian state bureaucracy had to choose which of the existing transfers to appropriate—voluntary (discretionary) or constitutional (laid down in the legislation) transfers—it would certainly choose the constitutional transfers.<sup>15</sup> The volume of resources associated with this type of transfer is three and half times greater than that allocated to voluntary transfers.<sup>16</sup>

Second, there is an undefined time horizon for receiving the voluntary transfers. If the question is stability in the flow of resources for a longer period to guarantee the payment of salaries without the need to “negotiate” the transfers received on a year-by-year, project-by-project, or agreement-by-agreement basis (there is specific legislation to determine what taxes are included in the “cake” to be transferred and how these resources are divided up),<sup>17</sup> the decision would once again favor constitutional transfers.

Third, the fact that there is nothing to counterbalance the receipt of the transfers (there is no specific return or project targets for the transfers to be received). The absence of any objectives stipulated in the Constitution or laws to establish goals that must be achieved to receive transfers is another important factor affecting this choice.<sup>18</sup> The only item in the Constitution establishing anything related to the investment of resources can be found in Article 161, Paragraph 2:

“... especially about the criteria for the sharing of the funds set forth in its item I, with the object of promoting social and economic balance between States and...”<sup>19</sup>

Under these conditions, it is very easy for state (subnational governments) bureaucrats to maximize their demands under constitutional transfers.

The bureaucracy can also dispute these resources with other interest groups in the states. Therefore, it is natural to investigate the following hypothesis.

## **H 2** *Interest groups exist and fight over the resources with the bureaucracy.*

Other interest groups can fight with the bureaucracy for resources that reach the states. Dougan and Kenyon (1988) developed a theoretical model in which interest groups, rather than voters, are the key actors in budget determination. They show that government budgeting can divert the allocation of funds away from the path preferred by the average voter due to lobbying by interest groups. Moreover, the study shows that when a subset of the population is lobbying for increased local expenditures on an item by intergovernmental transfers, this process increases the income of individuals who contributed to the local lobbying effort by a possible reduction in local taxes.<sup>20</sup>

<sup>15</sup>Dougan and Kenyon (1988) have shown that special-interest groups can be expected to be more easily mobilized in respect to categorical grants rather than general grants.

<sup>16</sup>Data are available from the National Treasury (2009).

<sup>17</sup>This legislation was established as part of the 1988 Constitutional Reform. Moreover, Constitutional Reforms are assumed as exogenous in the literature. Blundell et al. (1998) used tax reforms in the US as an exogenous instrument for marginal tax variation among individuals. See also Hausman and Poterba (1987).

<sup>18</sup>Objectives defined in the legislation would help in the attempt to block the demand existing in the bureaucracy.

<sup>19</sup>We describe how the transfer system works in Brazil in greater detail in the next section.

<sup>20</sup>The authors conclude that the model contemplates the observed empirical result that the flypaper effect has different effects on distinct categorical expenditures. This is due to the simultaneous lobbying of different activities with the specific pressure groups involved.

On the other hand, Schneider and Ji (1987) showed that the higher the degree of competition between municipalities attempting to attract residents by means of alternative tax/expenditure packages, the more constrained are the bureaucrats' attempts to maximize their own welfare by maximizing their budgets.<sup>21</sup>

**H 3** *Resource appropriation is concentrated or extended to include all members of the bureaucracy.*

Regardless of the intrinsic nature of the appropriation of resources by the bureaucracy, this process can be centralized in specific groups. Within the bureaucracy, the groups that make decisions concerning the allocation of resources can benefit most. As Brazilian public employees serve under two different types of labor contracts (one is statutory and the other includes the same rights that are attributed to a private sector employee—in accordance with the Consolidated Labor Laws—CLT),<sup>22</sup> benefits may be provided to specific groups within the bureaucracy, such as statutory employees or managers. Statutory employees hold positions with better-structured careers and are, therefore, better organized.<sup>23</sup>

### 3 The federal transfer system in Brazil

The Brazilian federal government's transfer of funds to states takes two forms: discretionary and constitutional (also called legal transfers). Discretionary transfers result from agreements or financial cooperation between the federal government and states. These resources depend on political negotiations between the federal legislators/senators of each state/region and the federal government. These funds originate from the federal budget. Moreover, the federal government bargains these resources in search for the support of parties that participate of its coalition.<sup>24</sup> Nonetheless, the weight of this type of transfer in state revenues is very small when compared to constitutional transfers. This type of transfer is equivalent to 7% of the state revenue on average.<sup>25</sup>

The basis of constitutional transfers has been established in legal terms, with transfers categorized as direct or indirect. Direct transfers encompass the sharing of federal government taxes with state governments. This is the case, for instance, of the tax on gold purchases (30% of the amount collected goes to the states) and the income tax paid by public employees (the total amount collected goes to the states). However, the volume of these resources is not highly significant. The most important source in terms of funds and relevance in state revenues are the indirect transfers, which are characterized as resources from a fund created for this specific purpose: the State Participation Fund (FPE).

<sup>21</sup>They used Tiebout's (1956) arguments.

<sup>22</sup>We describe the differences in the next section.

<sup>23</sup>The best way to test this assumption would be to compare similar occupations in the private and public sectors. Since any attempt to do this depends on the number of observations of each occupation in the database (reducing the space for investigation) and our central aim here is to know whether appropriation into staff and lowest-paid groups is the same for public and private sector workers on average, we test whether there is any difference between the average results and the lower and higher quartiles in the sample using quantile regressions.

<sup>24</sup>There is no dichotomy between public choice and public finance if the allocation of the transfers to the lowest levels of government is affected by political factors and equity/efficiency matters. See Grossman (1990).

<sup>25</sup>Between 1986 and 2002. Data available from Ipeadata (2009).

The basic idea behind the constitutional or legal transfer system (of which the FPE is a part) is to move resources from the richer, more industrialized parts of the country to the poorer, less industrially developed parts. The Brazilian grant system is structured to correct regional differences. Therefore, it does not have the authority to determine whether funds are allocated in the most efficient way, as is the case in Australia (Commonwealth Grants Commission), for instance. This absence of evaluation must count as one factor that allows the bureaucracy to appropriate a large portion of the resources transferred.<sup>26</sup>

The source of the resources for these transfers was defined in the 1988 Constitution. Article 159 of the Federal Constitution states that the Union will hand over 21.5% of federal tax revenue (Industrialized Goods Tax—IPI, and Income Tax—IR) to form the FPE.

The South and Southeast regions of the country (the richer, more industrialized regions)<sup>27</sup> provide 89.12% and 80.96% of the country's total IPI-IR revenues, respectively (average for the 1994–2002 period).

The distribution of resources by region was regulated in Complementary Law No. 62 of 1989.<sup>28</sup> Although Article 2 states that the following criteria are temporary, they remain in force to this day:

- (a) 85% of the resources in this fund are intended for the states in the north, northeast, and center-west regions, and 15% are for states in the south and southeast regions; and
- (b) based on this criterion, the complementary law defines the distribution coefficients by states, where the state of São Paulo, the richest, receives only 1.0% of the fund, the state of Bahia receives the highest percentage (9.39%) despite not being the poorest state in *per capita* income terms, and Piauí, the poorest state, receives only 4.32% of the fund.<sup>29</sup>

#### 4 The public-private sector wage differential as a measure of appropriation

In order to analyze the wages paid to public servants employed by Brazilian state governments and to test whether there is a premium or penalty in relation to the wages paid to employees in the private sector, we use the methodology proposed by Oaxaca (1973). The purpose of this methodology is to decompose the wages into observable and nonobservable employee characteristics. We used data from the 26 Brazilian states and the Brazilian Federal District from 1995 to 2004 to calculate the wage differentials. Our primary data source was the National Household Sample Survey (PNAD) published by the Brazilian Institute for Geography and Statistics (IBGE).<sup>30</sup> In calculating the wage differentials, we only included

<sup>26</sup>Worthington and Dollery (1998) described the Australian transfer system.

<sup>27</sup>The South and Southeast regions are responsible for 75.19% of the national GDP (1985–2003). Data available from IPEADATA.

<sup>28</sup>As the origin of the Fund predates the Constitution, during the period when the new Constitution was approved and complementary law came into effect, State Participation Fund (FPE) resources continued to be distributed in accordance with the terms of Law 5,172 of 1966.

<sup>29</sup>As there are no technical criteria for the definition of these coefficients, there was a lot of speculation on their political construction. It is always worth remembering that these criteria are still in force.

<sup>30</sup>We adopted this period because our aim is to conduct a comparative analysis in an environment where the states were under hard budgetary constraint. Before the Inflation Stabilization Plan (the Real Plan—1994), the federal government was able to finance states without any problems. With the end of inflation, this financing became impossible. The year 2000 could have been included because it was a census year. The PNAD and the Census are not done in the same years and the results are not directly comparable. PNAD is similar to the Panel Study of Income Dynamics (PSID) in the United States. The data is not longitudinal, but includes more households (100,000 against 8,000 for PSID).

employed people between 18 and 65 years old who worked in urban areas (self-employed workers and employers were excluded) or were civil servants employed by Brazilian state governments (state public sector workers). These constraints were imposed on the overall sample to make the public and private sector employees comparable.<sup>31</sup> Moreover, any information that did not allow determining whether a worker was from the public or private sector was also disregarded. Only data relating to the primary job were considered, since secondary occupations have specific characteristics that could affect the results. Finally, all individual wages (including premium and fringe benefits) were adjusted to a 40-hour work week.<sup>32</sup>

In order to use the technique developed by Oaxaca (1973), the following observable characteristics of the workers were chosen: educational level (years of schooling, squared of years of schooling), age, square of age, gender (dummy),<sup>33</sup> race (dummy),<sup>34</sup> job experience (years on the job, square of the years on the job) and worker unionization (dummy).<sup>35</sup> To test for robustness, additional tests were carried out with different samples of both public and private sector workers.

For public sector workers, we used a sample that included statutory public sector employees<sup>36</sup> and CLT public sector employees.<sup>37</sup> For the private sector workers, we used three distinct samples: one considered employees in the manufacturing sector, another considered employees in the formal private sector (employees with legal rights in accordance with Law 5.452 of May 1943) and the final one including all employees (formal and informal employees). Originally, we did not include the manufacturing sector, but Van Rijckeghem and Weder (1997)<sup>38</sup> used this sector to study wage differentials because it is closer to the public sector in terms of activities, especially at lower wage levels. The separation of private workers into formal and informal was used to parallel the methodology used by Panizza (2001). The descriptive statistics of the variables used in each sample are included in Appendix 2.

The results for the wage comparison between the public and private sector worker sample<sup>39</sup> are shown in Table 1. The results indicate that the wage premium for civil servants

<sup>31</sup>Self-employed workers in the public sector do not exist (as they do in the private sector) and the admission requirement to the public sector imposes a minimum age of 18. In addition, civil servants rarely work in rural areas, except in specific isolated cases, such as borders or agricultural inspections.

<sup>32</sup>This calculation implicitly assumes that the value of the hourly wage does not vary according to the number of hours worked, and that the majority of employees work 40 hours a week.

<sup>33</sup>The gender dummy is one for males and zero otherwise.

<sup>34</sup>The race dummy is one for whites and zero otherwise.

<sup>35</sup>The performance of a specific industry's trade union can result in the establishment of higher wages than those defined in a competitive equilibrium. The value of this dummy is one for unionized workers and zero otherwise.

<sup>36</sup>Statutory workers are civil servants who have legally assured job tenure and who receive full pensions (100% of their last wage) upon retirement.

<sup>37</sup>CLT public workers are public workers hired under the same rules as formal workers in the private sector. They do not have a legal right to job tenure; however, dismissal is difficult. We could say that their job tenure is more precarious than that of statutory workers. The expression "CLT" has its origin in Law 5,452 of May of 1943, entitled the Consolidated Labor Laws (CLT in Portuguese). This law establishes the rules of labor relations in the private sector. It is an old law but has had few modifications since it was first enacted. Most CLT public sector workers are employed at publicly-owned companies (and not at direct administration).

<sup>38</sup>They did not use the Oaxaca (1973) technique.

<sup>39</sup>It is worth remembering that we are always considering only civil servants employed by Brazilian state governments in this category.



**Table 1** Premium (+) or penalty (–) in the average wages differential by region in Brazil

Regions	[1]	[2]	[3]	[4]	[5]	[6]
North	35.5%	37.4%	48.7%	43.1%	48.4%	62.9%
Northeast	24.6%	16.2%	18.0%	26.0%	17.9%	19.4%
Center-West	23.3%	15.3%	17.4%	22.8%	14.9%	16.3%
Southeast	11.7%	8.5%	3.0%	12.6%	9.1%	3.5%
South	4.6%	1.8%	–0.8%	2.6%	–0.2%	–3.0%
Brazil	22.6%	18.0%	20.4%	24.6%	20.8%	23.6%

Note: [1] Statutory + CLT public sector workers/Formal and Informal private sector workers; [2] Statutory + CLT public sector workers/Formal private sector workers; [3] Statutory + CLT public sector workers/Manufacturing private sector workers; [4] Statutory public sector workers/Formal and Informal private sector workers; [5] Statutory public sector workers/Formal private sector workers; [6] Statutory public sector workers/Manufacturing private sector workers. Data for 1995–2004

(public sector employees) in Brazil is not uniform across the different regions. Moreover, the highest premium is paid in states in the north region.<sup>40</sup>

Based on these data, it is possible to affirm that there is a dichotomy: the poorer regions registered higher wage differentials between the wages of public and private sector workers. For the set of proxies used, the average premium for the states in the north region was 46%. The states in the south region, for instance, have a premium of 0.83%.<sup>41</sup>

Depending on the measure used in the calculation, the penalty is found in only three situations. It must also be stressed that when the “cake” is divided up, states in the north region receive more than those in the south region.

## 5 Empirical analysis

### 5.1 The model

The set of hypotheses presented above (H1, H2, and H3) can be described by the following model:<sup>42</sup>

$$Y_{it} = \beta_0 + \beta_1 GRANTS_{it} + \beta_2 POLITICAL_{it} + \beta_3 INTERESTGROUPS_{it} + \beta_4 PUBLICWORKER_{it} + f_i + \varepsilon_{it}$$

<sup>40</sup>A region corresponds to a group of states.

<sup>41</sup>We have not been able to identify appropriate instruments for all simultaneous estimations to correct a possible bias resulting from the choice of the employment sector (public vs. private). Several authors suggest that when one has weak instruments or when errors are normally distributed, the costs of using Heckman’s method can largely outweigh its benefits (Blau and Kahn 1992). For different estimations and, once again, as a consequence of using “weak instruments,” the results were similar to the OLS results. Panizza and Qiang (2005) used family status (single, married, etc.), other family income, and number of children under 6 years as instruments (weak instruments) and found that there is a premium for the public sector (federal government) in Brazil, but one that is overestimated using OLS (average 19% premium for the public sector and 5% premium on average with the selection model).

<sup>42</sup>The descriptive statistics of variables used in the model are shown in Appendix 3.

where  $i = 1, 2, \dots, 27$  states;  $t = 1995, 1996 \dots 2004$ ;  $f_i$  is the individual effect; and  $\varepsilon_{it}$  is the random error term. Our sample consists of 26 Brazilian states and the Brazilian Federal District between 1995 and 2004. The variable  $Y$  represents the wage differential between the public and private sectors for different “proxies.” The *GRANTS* variable is the percentage of transfers from the federal government (constitutional transfers) relative to current state revenues. The *POLITICAL* variable represents a set of political variables related to the electoral moment, which can influence the bureaucracy’s attempts to appropriate resources. The set of *POLITICAL* variables includes: (a) the *REELECTION*<sub>Coalition</sub> variable stands for the reelection of an incumbent of coalition,<sup>43</sup> as the same group can perpetuate or jeopardize the interests of self-bureaucracy; (b) the *FRACTIONALIZATION*<sup>44</sup> variable represents the fractionalization of the elected legislative coalition that, once increased, may introduce more (or new) interests that must be taken into account given that any government needs legislative support; and (c) the *WINNER FIRST ROUND* variable represents the percentage of votes that the winner of the first round of the election obtains with respect to the total number of valid votes. The purpose of this variable is to show that a more competitive electoral process may channel additional resources into the bureaucracy in the form of wages given the size and importance of this group at a specific electoral moment.<sup>45,46</sup>

The *INTERESTGROUPS* variable represents the set of interest groups that may also “fight over” the resources coming into the state, including: the percentage of people over 60 years in the total state population (*OLDEST*),<sup>47</sup> the participation of the service sector in the total state GDP (*GDP*<sub>service</sub>),<sup>48</sup> the participation of the industrial sector in the total state GDP (*GDP*<sub>industry</sub>),<sup>49</sup> and the GINI index (*GINI*), which represents the demand for state services by those who are more deprived.

The *PUBLIC WORKER* variable represents the number of state public-sector workers divided by the number of workers in the state. Since this ratio is high in Brazilian states, we considered the use of this variable as a control.<sup>50</sup> State inflation rates, unemployment rates, state GDP per capita, and population growth were not included as controls, as data about in-

<sup>43</sup>Dummy with value equal to 1 if some party belonging to the last electoral coalition was reelected and zero otherwise.

<sup>44</sup>One of the characteristics of the government in Brazil is “governance by alliances” (Samules 2000). Although governors may be strong, they need support from the state legislation. The fractionalization index is the Herfindhal index:  $1 - \sum_{k=1}^K p_k^2$ , where  $p_k$  indicates the number of seats occupied by each party elected to a state’s legislature.

<sup>45</sup>Voting for state governor in Brazil is compulsory for all citizens between 18 and 65 years old. Elections are held on set dates (every 4 years) with a run-off if the winner of the first-round ballot does not receive 50% + 1 of the valid votes cast. Only the two candidates with the highest number of first-round votes compete in the run-off.

<sup>46</sup>A lower percentage of votes obtained indicates a more competitive election.

<sup>47</sup>The social security rules are defined by the federal government and the retirement pensions also are paid to it. Therefore, this appropriation by the elderly would have to take place through other forms of social benefits (health, for instance).

<sup>48</sup>We excluded the government activities from the service sector. The Brazilian statistics include the government.

<sup>49</sup>The respective GDPs of the service and industrial sectors was the best way we could find to represent private interests in the state. Surely these interest groups demand resources that reach the states to be used on infrastructure projects, for instance. In this case, this type of demand leaves fewer resources for the bureaucracy to appropriate. See the construction of private group variables in Lowry and Potoski (2004).

<sup>50</sup>Table 9 (Appendix 3) shows that there are states where civil servants hired by the government represent 54.9% of the total number of workers.

flation and unemployment rates are available only for some state capitals.<sup>51</sup> The state GDP per capita and population growth rate were not included in the tests because the formula for distributing the constitutional grants across states is correlated with these variables. Originally, we also included the fiscal behavior (primary result) of the federal government and the national inflation rate in these tests. They were later excluded due to collinearity with other variables. All regressions were controlled by time dummies (year), which are not reported. We also did not include one regional dummy (north, northeast, midwest, southeast, and south) in the final results because it was not significant at any moment and did not produce any differences in the results.

To test H1, H2, and part of H3 (the part related to the appropriation of resources by statutory employees who have job stability with respect to other employees), we used panel estimation methods.

We prefer to present our results in a panel instead of using pooled estimates for three technical reasons. First, the LM test (Breusch and Pagan 1980) identified that the variance of the nonobservable effect was statistically different from zero in all estimates.<sup>52</sup> Thus, the pooled estimates would be neither consistent nor efficient. Second, in the tests proposed by Baltagi and Li (1995) for first-order serial autocorrelation in the residuals, we found no evidence that autocorrelation did not exist (the idiosyncratic errors indicate first-order correlation). Third, in the combined test of the possibility that the variance of the nonobservable effect and first-order serial autocorrelation were statistically equal to zero—as proposed by Baltagi and Li (1991)—we found no evidence to support pooling. Together, these evaluations reject any attempt to use pooled estimates.

We used the Hausman (1978) test to determine whether the coefficients of the fixed and random effects are systematically different. Based on these results, we decide not to adopt the fixed effect (the individual effect is not correlated with the model variables).

However, both the Wald test for heteroscedasticity<sup>53</sup> and Wooldridge test (2002, pp. 282–284) for autocorrelation detected the presence of heteroscedasticity across panels and autocorrelation within panels.<sup>54</sup> Given this, we used Panel Corrected Standard Errors (PCSE) to obtain robust results. To account for serial correlation of residuals within panels we assumed a simple AR(1) autoregressive process.

Finally, for the remainder of H3 (which tests if the benefits are directed toward staff groups or to the lowest-paid groups), we used Quantile Regression (QR), which is the most suitable technique in these cases. QR is a technique (maximum likelihood) used to quantify the effect of the independent variable at different points of a conditional distribution (quantiles) of the dependent variable. Whereas OLS estimates the effect of the independent variable on an average conditional distribution of the dependent variable, QR estimates the effect of the independent variable at any point on the conditional distribution, such as the average, median, highest, or lowest 10%, and so on. We followed the procedures discussed by Koenker and Basset (1978).

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<sup>51</sup>The rate of inflation and/or unemployment is used in the estimates in the panel for countries (Volkerink and de Haan 2001; Perotti and Kontopoulos 2002).

<sup>52</sup>Greene (2003) recommends only the Breusch and Pagan (1980) test and the Hausman (1978) test to choose the model's empirical structure.

<sup>53</sup>See Greene (2003).

<sup>54</sup>The autocorrelation was only detected in Column [3] of Table 2.

**Table 2** The effect of transfers on appropriation with different proxies for wage differentials

	[1]	[2]	[3]	[4]	[5]	[6]
<i>CONSTANT</i>	-0.02 (-0.05)	-0.55 (-1.03)	0.45 (0.53)	-0.39 (-0.68)	-1.09 (-1.44)	0.16 (0.14)
<i>GRANTS</i>	0.39*** (3.45)	0.13 (0.84)	0.27 (1.13)	0.38*** (2.45)	0.0002 (0.00)	0.18 (0.55)
<i>OLDEST</i>	-1.01 (-1.44)	1.07 (0.94)	-2.25* (-1.65)	-0.69 (-0.62)	1.89 (1.03)	-2.35 (-1.02)
<i>GDP</i> <sub>Service</sub>	1.39** (2.33)	2.43*** (3.13)	1.15 (0.71)	1.97** (2.21)	3.54*** (3.05)	3.47 (1.22)
<i>GDP</i> <sub>industry</sub>	-0.60*** (-4.12)	-0.35** (-2.08)	-0.50** (-2.03)	-0.64*** (-3.44)	-0.30 (-1.34)	-0.36 (-0.96)
<i>GINI</i>	0.24 (0.55)	0.09 (0.12)	-0.45 (-0.40)	0.36 (0.51)	0.32 (0.27)	0.05 (0.03)
<i>PUBLIC WORKERS</i>	-0.19 (-0.66)	1.00** (2.18)	1.15* (1.68)	0.18 (0.41)	1.95*** (2.75)	1.98* (1.92)
<i>REELECTED</i> <sub>Coalition</sub>	0.013 (0.54)	0.03 (1.25)	-0.02 (-0.54)	-0.007 (-0.24)	0.01 (0.32)	-0.08 (-1.19)
<i>FRACTIONALIZATION</i>	0.31 (0.94)	0.52 (1.37)	-0.14 (-0.25)	0.54 (1.33)	0.72 (1.44)	0.01 (0.02)
<i>WINNER_FIRST</i>	0.04 (0.28)	-0.18* (-1.09)	-0.32 (-1.05)	0.13 (0.71)	-0.15 (-0.67)	-0.33 (-0.84)
Number of observations	243	243	243	243	243	243
<i>R</i> <sup>2</sup>	0.41	0.34	0.31	0.36	0.33	0.27
Wald-test (prob>chi2)	124.22 (0.000)	66.58(0.000)	62.56(0.000)	84.35(0.000)	53.23(0.000)	42.98(0.000)

\*Significant at 90% (*t*-statistic)

\*\*Significant at 95%

\*\*\*Significant at 99%

## 5.2 Empirical results

Table 2 shows the results of the model presented with six different proxies of the sample of workers used to estimate wage differentials. Significant results for specific variables are highlighted.

In the first three columns, the wages of all state public sector workers (statutory and CLT) are compared to the wages of different groups of private sector workers: [1] the private sector as a whole (formal and informal workers); [2] the private sector represented only by those who are formally employed; and [3] the private sector represented only by workers in the manufacturing sector. In the last three columns ([4], [5] and [6]), the wages of the statutory state public sector workers are compared to the same groups of private sector workers.

In all estimates, the following variables were never significant: *GINI* (representing the interests of the less favored group in the state), *REELECTED*<sub>Coalition</sub> (the maintenance of the incumbent coalition), and *FRACTIONALIZATION* (representing the fractionalization of the electoral coalition). It is noteworthy that the increase in public employment in the states

relative to total employment (*PUBLIC WORKERS*—significant in four of the six columns) does not reduce the volume of resources appropriated in the form of wages, as would be expected. A higher number of employees in the public sector increases the volume of resources appropriated. We intend to study these results in greater depth in the future. One possible explanation for this is that the bureaucracy as a group gets stronger as it grows, increasing its ability to exert influence, and consequently appropriate resources.

Similarly, we were not surprised by the results on the competitiveness of the political system. Although the variable was significant only once, our intuition predicted that the more competitive the political system (*WINNER\_FIRST ROUND*), the easier it would be for the bureaucracy to appropriate resources (significant in Column [2]). Our main investigation (H1) was confirmed when considering the calculation of the differentials between the wages of all state public sector employees with respect to private sector employees as a whole or the statutory (state public sector) employees with respect to all private sector employees (Columns [1] and [4]). It is observed that a one point increase in the share of constitutional transfers in the revenue of the states increases the wage differential of the public sector employees by around 0.4 with respect to private sector employees. There is, therefore, evidence that state bureaucracies appropriate the transfers received.

Among the interest groups highlighted that can dispute the resources channeled by the bureaucracy (H2), people over 60 years old and the industrial sector seem to vie for those resources, as there is a reduction in wage differentials when their corresponding variables (*OLDEST* and  $GDP_{\text{industry}}$ ) increase. In one situation (Column [3]), *ceteris paribus*, an increase in people over 60 years old as a share of the total population corresponds to a drop in the wage differential between the public and private sectors. In four cases (Columns [1], [2], [3], and [4]), *ceteris paribus*, an increase in industry participation in the state GDP also reduces the wage differential between the public and private sectors.

On the other hand, there is one group that loses to the bureaucracy in the battle for resources: the service sector (a sector that includes a large portion of the underground economy and is, therefore, the least legally organized sector of the economy). In the four situations presented, the increase in the participation of the service sector in the state GDP represents, *ceteris paribus*, an increase in the wage differential. There is, therefore, as suggested in the hypothesis, a struggle for resources involving the bureaucracy and other groups in the state.

The results in columns [1] and [4] enable us to check for the presence of any localized benefits for specific groups within the bureaucracy itself (H3). The results show that this possibility does not occur. The appropriation of resources coming from constitutional transfers is practically unchanged (0.39 for all public sector employees and 0.38 for statutory workers alone).

In order to complete this type of investigation, we checked for the presence of any benefits for the groups situated at the top (staff groups—the 10% highest wages) or bottom (lowest salaries—the 10% lowest wages) of the wage pyramid with respect to the average value of the wages of existing employees. We used QR to observe this difference, as mentioned earlier. Based on the estimates in Columns [1] and [4], where the variable *GRANTS* is significant, we can find the results of the coefficients for the 10% highest and lowest wages relative to the average group in Table 3.

The hypothesis tests regarding the equality of the coefficients given in the last two columns of Table 3 guarantee that there is no difference in appropriation, whether the wages of the groups are at the top or bottom of the wage pyramid, with respect to the transfers appropriated by those who receive wages that correspond to the average value of the sample. Thus, neither statutory public employees nor those at the top or bottom of the wage pyramid appropriate resources in a different way. Hence, the proposal in H3 is not shown

**Table 3** The effect of the variable GRANTS on different groups of wage differentials

Column	$\beta_1$ (10% lowest)	$B_1$ (50%)	$\beta_1$ (10% higher)	H: $\beta_1$ (10% lowest)- $\beta_1$ (50%) = 0	H: $\beta_1$ (10% higher)- $\beta_1$ (50%) = 0
[1]	0.44	0.36	0.55	0.32 <sup>*</sup> 0.57 <sup>**</sup>	1.18 <sup>*</sup> 0.27 <sup>**</sup>
[4]	0.49	0.35	0.61	0.39 <sup>*</sup> 0.53 <sup>**</sup>	1.63 <sup>*</sup> 0.20 <sup>**</sup>

Note: The variable was always significant at 5%

\* *F* Statistic

\*\* *P*-value

to be valid, since the appropriation of resources includes all members of the bureaucracy indiscriminately.

## 6 Main conclusions

The object of this study was to explore whether the transfers received by state governments in Brazil are being appropriated by the bureaucracy as wages. Thus, we used the wage differential between the public and private sectors as a proxy for this appropriation. Although there are theoretical reasons justifying higher salaries to public workers (Becker and Stigler 1974), we believe that there is no reason for wages to be higher in the public sector than in the private sector (premium) without the presence of appropriation. This approach is important due to the difficulty of isolating appropriation through the share of total expenses spent on wages. It is very difficult to distinguish the situation where expenditures on wages are justified by the services provided from those wages, which is a characteristic of appropriation. We used the technique for wage decomposition proposed by Oaxaca (1973), and our results showed that constitutional transfers stimulate the appropriation of resources by the bureaucracy. When we consider all types of state public servants relative to all types of private sector workers, or statutory state public servants relative to all types of private sector workers in the wage differential measure, the one point increase in the share of constitutional transfers in the state's revenue increases the wage differential between public and private sector wages by around 0.4 points.

We have also shown that private groups exist within the state itself (as a geographical region) and fight for these resources against the bureaucracy. Among the highlighted interest groups, people above 60 years old and the industrial sector appear to compete with the bureaucracy given that they reduce the volume of resources appropriated by the bureaucracy as wages. On the other hand, one group loses in the competition for resources with the bureaucracy: the service sector (which contains a large part of the informal economy, and is, therefore, the least organized).

Finally, the results confirm that the resources appropriated are distributed uniformly across the various groups composing the bureaucracy. Neither statutory employees nor those at the top or bottom of the wage pyramid show different effects in terms of resource appropriation.

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### **Appendix 1: Institutional description justifying Hypothesis 1: an intergovernmental grant stimulates the appropriation of resources by the bureaucracy**

In this appendix, we describe certain facts, which explain one of the basic hypotheses of the current paper: civil servants in state governments appropriate a percentage of the revenue transferred by the federal government in the form of wages.

Since each state in Brazil (26 states and the Brazilian Federal District) has its own Constitution and ordinary laws which discipline public-sector wages (although the Federal Constitution sets out general rules for this purpose), we did not reproduce the laws of each state in detail to show what happens in favor of civil servants. We simply provide an overview of the situation, mentioning some cases that illustrate what happens in most states in the different branches (executive, legislative, and judiciary branches) and the situation in specific regions.

The wages of civil servants in Brazil are defined through laws whose bills are drawn up by people who are also civil servants. No external agency or consulting council issues opinions on, or defines, the wages paid to civil servants. As a result, legal excesses are possible, including the accumulation of additional payments for time in service by civil servants (annual or 5-year benefits, sometimes in a cumulative fashion), regardless of the situation of the state or national economy, or additional remuneration for heading a department or holding temporary positions which are incorporated into regular wages and retirement pensions (in some cases, these positions are held for less than a month).

These and other benefits have been created gradually, initially by a state government, and later were adopted by the remaining states. Only in more recent years have state governments been trying to reduce these benefits, but they have been doing so gradually and slowly, in order to not lose political support from civil servants. As can be seen in Appendix 3 of this paper (descriptive statistics), civil servants are also major voters, considering the participation of this group in the labor force of some states.

The advantages are not restricted to civil servants of the executive branch. In the Legislative and Judiciary branches, the situation before the 1988 Constitutional Reform was even worse. No bill was required for salary raises to be defined or for benefits to be established. In these two branches, salary raises or advantages and benefits were defined through internal resolutions, without the requirement of a public announcement of these decisions. The 1988 Constitutional Reform eliminated this possibility for the two branches, but the advantages gained before the reform were preserved.

As a comparison, in states in the northeast region (the poorest region of Brazil), it is almost impossible for private sector workers to enjoy the advantages granted to civil servants, since a significant percentage are not formal workers, meaning that labor relations are very precarious, there is high labor force turnover, and wages are extremely low in the private sectors.

The revenues of different governments in the north region, in turn, are fundamentally dependent on transfers from the federal government, and the wage differentials between the civil servants and workers in the private sector are very high. Until as recently as 20 years ago, most of these states had no administrative autonomy. They were regions managed by the federal government and the civil servants who worked there were federal employees.

They earned good salaries since the wages paid by the federal government were higher than those paid by state and municipal governments. When these regions became states, the staff hired by the new administration started earning wages that were very similar to those paid by the federal government, even if the local economic activity, revenue, and labor market were (as they still are) completely inconsistent with the salaries paid by the governments of these states. This correlation between the wages paid to state and federal civil servants (who are still active in these territories) continues to this very day: all benefits granted to federal civil servants are extended to state civil servants.

Nothing similar occurs in the private sector, where compensation rules, when ensured by law, have been the same for many years. The law governing labor relations between employers and employees in the private sector dates from 1943 and no amendments made to it since that time have involved new wage advantages.

These are, therefore, some examples of facts leading to our hypothesis.

## Appendix 2

**Table 4** Basic statistics of variables adopted in the calculation of the wages of workers in the private manufacturing sector

Variables	Average	Std. Error	Minimum	Maximum
Dependent variable				
LN adjusted wage	5.96	0.74	3.00	4.77
Independent variable				
Years of schooling	8.40	3.85	1.00	16
Years of schooling <sup>2</sup>	85.72	66.96	1.00	256
Age	33.42	10.25	18.00	65
Age <sup>2</sup>	1221.91	755.11	324.00	4225
Gender Dummy	0.77	0.42	0.00	1
Race Dummy	0.58	0.49	0.00	1
Years of experience (on the job)	4.75	6.05	0.00	58
Years of experience (on the job) <sup>2</sup>	59.14	142.98	0.00	3364
Union Dummy	0.30	0.46	0.00	1



**Table 5** Basic statistics of variables adopted in the calculation of the wages of employees in the formal private sector

Variables	Average	Std. Error	Minimum	Maximum
Dependent variable				
LN adjusted wage	5.96	0.74	5.65	6.24
Independent variable				
Years of schooling	9.32	3.82	1.00	16
Years of schooling <sup>2</sup>	101.74	69.44	1.00	256
Age	32.93	10.21	18.00	65
Age <sup>2</sup>	1188.54	751.30	324.00	4225
Gender Dummy	0.65	0.48	0.00	1
Race Dummy	0.58	0.49	0.00	1
Years of experience (on the job)	4.54	5.72	0.00	58
Years of experience (on the job) <sup>2</sup>	53.29	132.64	0.00	3364
Union Dummy	0.28	0.45	0.00	1

**Table 6** Basic statistics of variables adopted in the calculation of the wages of employees in the formal and informal private sector

Variables	Average	Std. Error	Minimum	Maximum
Dependent variable				
LN adjusted wage	5.83	0.78	5.65	6.24
Independent variable				
Years of schooling	8.95	3.89	1.00	16
Years of schooling <sup>2</sup>	95.59	69.02	1.00	256
Age	32.42	10.51	18.00	65
Age <sup>2</sup>	1161.63	771.29	324.00	4225
Gender Dummy	0.66	0.47	0.00	1
Race Dummy	0.55	0.50	0.00	1
Years of experience (on the job)	4.09	5.57	0.00	58
Years of experience (on the job) <sup>2</sup>	47.70	129.32	0.00	3364
Union Dummy	0.21	0.41	0.00	1

**Table 7** Basic statistics of variables adopted in the calculation of the wages of statutory public employees and CLT public employees

Variables	Average	Std. Error	Minimum	Maximum
Dependent variable				
LN adjusted wage	6.52	0.81	5.65	6.24
Independent variable				
Years of schooling	12.20	3.66	1.00	16
Years of schooling <sup>2</sup>	162.42	77.32	1.00	256
Age	38.83	10.01	18.00	65
Age <sup>2</sup>	1608.67	801.43	324.00	4225
Gender Dummy	0.44	0.50	0.00	1
Race Dummy	0.57	0.50	0.00	1
Years of experience (on the job)	11.21	8.23	0.00	58
Years of experience (on the job) <sup>2</sup>	193.90	230.54	0.00	3364
Union Dummy	0.37	0.48	0.00	1

**Table 8** Basic statistics of variables adopted in the calculation of the wages of statutory public employees

Variables	Average	Std. Error	Minimum	Maximum
Dependent variable				
LN adjusted wage	5.83	0.78	5.65	6.24
Independent variable				
Years of schooling	8.95	3.89	1.00	16
Years of schooling <sup>2</sup>	95.59	69.02	1.00	256
Age	32.42	10.51	18.00	65
Age <sup>2</sup>	1161.63	771.29	324.00	4225
Gender Dummy	0.44	0.50	0.00	1
Race Dummy	0.57	0.50	0.00	1
Years of experience (on the job)	4.09	5.57	0.00	58
Years of experience (on the job) <sup>2</sup>	47.70	129.32	0.00	3364
Union Dummy	0.37	0.48	0.00	1

## Appendix 3

**Table 9** Descriptive statistics

Variables	Observations	Average	Std. Error	Minimum	Maximum
Statutory + CLT public workers/formal and informal private workers [1]	243	0.247	0.307	−0.203	2.000
Statutory + CLT public workers/formal private workers [2]	243	0.179	0.277	−0.190	1.903
Statutory + CLT public workers/manufacturing private workers [3]	243	0.201	0.445	−0.685	2.958
Statutory public workers/formal and informal private workers [4]	243	0.246	0.307	−0.203	2
Statutory public workers/formal private workers [5]	243	0.208	0.389	−0.227	3
Statutory public workers/manufacturing private workers [6]	243	0.236	0.560	−0.800	3.379
GRANTS	243	0.318	0.223	0.003	0.873
PUBLICWORKERS	243	0.241	0.113	0.071	0.549
OLDEST	243	0.076	0.019	0.029	0.13
GDP <sub>Service</sub>	243	0.078	0.035	0.022	0.228
GDP <sub>industry</sub>	243	0.299	0.118	0.062	0.644
GINI	243	0.572	0.036	0.426	0.656
REELECTED <sub>Coalition</sub>	243	0.419	0.494	0	1
FRACTIONALIZATION	243	0.892	0.045	0.765	0.951
WINNER_FIRST_ROUND	243	0.498	0.099	0.296	0.807

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