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Bottom-Up Structure:
Collective Bargaining, Transfer Rights, and the Plight of Disadvantaged Schools

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Abstract

In the positive theory of public bureaucracy, the prevailing view is that the structure of public agencies is designed from the top down by political superiors. Faced with bureaucrats who may disagree with them on policy and who are advantaged by private information, superiors choose rules and procedures to try to ensure that agencies do what they are supposed to do. At least some portion of bureaucratic structure, however, cannot be explained in this way. It emerges from the bottom up through collective bargaining, it is driven by the organizational power of ordinary bureaucrats rather than by their information power, and it results in work rules intended to promote their occupational interests rather than to have any specific effects on implementation or policy—although the unintended consequences for the latter may be significant. When this happens, the theory overlooks an aspect of structure that is essential for understanding the way government operates. This paper begins to explore the connections between collective bargaining, bottom-up structure, and bureaucratic behavior. The empirical focus is on the public schools, the bureaucrats are public school teachers, and the analysis shows that a very common type of contract rule—which gives senior teachers transfer rights over jobs—affects the way teachers distribute themselves across schools, and leads to a situation in which disadvantaged schools (those with high percentages of minorities) find it especially difficult to attract quality teachers. What the analysis shows, more generally, is that even very simple types of bottom-up structure can have significant effects on bureaucrats and their agencies—and the current theory needs to recognize as much.

Bottom-Up Structure: Collective Bargaining, Transfer Rights, and the Plight of Disadvantaged Schools

Students of American government have rarely viewed collective bargaining as a compelling subject of analysis, and in some respects this is understandable. Collective bargaining in this country has traditionally been about the details of employment in individual firms and organizations. And while these issues—of pay, fringe benefits, retirement, working conditions—occasionally rise to political prominence, the fact that the American system of labor-management relations is so decentralized and limited in scope, with only 9% of the private workforce covered by collective bargaining, suggests that its outcomes are typically rather removed from the center of politics (U.S. Census Bureau, 2005).

Yet a focus on workers in the private sector can be deceiving. Since the 1960s, the workers of greatest relevance to American government—namely, the government's own workers—have been far more successful at getting organized and gaining collective bargaining rights than private sector workers have. Some 41% of them are covered by collective bargaining nationwide, and the figures are often much higher for state and local governments, where most public policies are carried out and most public money is spent (U.S. Census Bureau, 2005; Freeman, 1986).

The rise of public sector unions has changed the dynamics of American politics. Bureaucrats are no longer just the quintessential insiders, gaining power from what they know and do within the administrative process. They are also organized for political action and well equipped for bringing their interests to bear on government through elections, legislatures, and the courts. The more prominent unions—such as the National Education Association (NEA), the American Federation of State, County, and Municipal Employees (AFSCME), and the Service Employees International Union (SEIU)—have huge, geographically dispersed memberships, large amounts of money for campaign contributions and lobbying, and highly sophisticated political organizations that they have parlayed into serious political

power at all levels of government. In states and localities, public sector unions of various types—representing teachers, police officers, fire fighters, nurses, prison guards, engineers, and a broad array of other government workers—are regular and often forceful participants in the political process (Blais, Blake, and Dion, 1997; Johnson and Libecap, 1994; Troy, 1994).

The rise of public sector unions has done more than affect the politics of American government. It has also affected its structure, and that is my focus here. When the masses of ordinary bureaucrats band together and engage in collective bargaining with their public employers, the resulting labor contracts are filled with countless work rules—rules that, by and large, protect and promote the occupational interests of workers, enhance worker rights and autonomy, and restrict the prerogatives and powers of management—and these work rules then become integral components of the structure of government itself (Kearney, 2000). This being so, they clearly help explain why governments are organized as they are. Some governments, of course, are much more affected by collective bargaining than others are, depending on the extent and strength of their unionization. But such variation simply makes the phenomenon more interesting and worthy of study. The fact is, collective bargaining is exceedingly common within the public sector, it is often a source of governmental structure, and—if institutions do matter—it is likely to be an important influence on bureaucratic behavior and governmental performance.

The positive theory of public bureaucracy is our discipline's most powerful means of explaining the structure of government, as well as of connecting structure to what government actually does in carrying out policy. Beginning in the early 1980s, its analytic framework—rooted in agency theory, transaction cost economics, and related theories of collective action and cooperation—has fundamentally shaped the way scholars think about bureaucracy (e.g., Weingast, 2002; Moe, 1997). As

it stands, however, it has nothing to say about structures that arise from collective bargaining by the government's own bureaucrats.

The prevailing theory has three salient features. First, its perspective on governmental structure is top-down: bureaucratic agencies are designed from above by political superiors, typically legislators and executives, who make the authoritative decisions about organization. Second, political superiors and their bureaucratic subordinates are both assumed to be motivated by policy. Third, the analysis centers on information problems: political superiors need to control the bureaucrats' implementation of policy, because the latter's policy ideal points may differ from theirs, but the bureaucrats have private information (mainly in the form of expertise) that gives them leverage in the relationship and threatens to generate compliance problems. The superiors respond to these information asymmetries by crafting structures that constrain the bureaucrats' behavior and keep them on a path consistent with the superiors' own policy preferences (e.g., McCubbins, Noll, and Weingast, 1987; Moe, 1989; Horn, 1995; Epstein and O'Halloran, 1999; Huber and Shipan, 2002; Lewis, 2003).

There is much to be learned from this theory, and it has been a major source of progress over the years in advancing the new institutionalism. But it is ultimately limited by the very features that are its hallmarks. The top-down approach focuses almost exclusive attention on political superiors, and fails to recognize that bureaucrats are not always on the receiving end of structural decisions made by others, but in fact can demand and initiate structures—from the bottom up, essentially—that promote their own interests. Similarly, the assumption that both politicians and bureaucrats are motivated by policy overlooks the fact that bureaucrats have occupational interests—in job security, autonomy, leisure, and so on—that are quite distinct from any policy concerns, but still important to them as employees when decisions about structure are being made. And finally, while a focus on the informational advantages of bureaucrats is surely justified, it fails to recognize that bureaucrats have an additional means of

exercising power over their superiors that can prove quite potent: they can get organized and use their organizational power—in politics, in collective bargaining—to see that their favored structures get adopted.

Were the theory to give bureaucrats more serious treatment as pivotal actors, its expectations about structure would be quite different (under some conditions) than they currently are. In the standard model, for instance, political superiors choose structures with the intention of promoting their policy objectives, and the argument is that, although their control is imperfect, they largely succeed in keeping bureaucrats on track (via appropriate structures) and getting the behaviors and policy outcomes they want. When the source of structure is bottom-up, however, the link between structure and implementation may be weak or absent. Public sector unions are primarily concerned with how the relevant work rules succeed in advancing their members' occupational interests, and less so (or not at all) with whatever effects these structures may also have on policy implementation and its outcomes (Freeman, 1986; Kearney, 2000). For the most part, the latter effects are unintended—although they could be quite significant in determining how well or poorly governments do their jobs. Indeed, because structures are adopted for reasons that have no necessary connection to implementation or policy, the unintended consequences may sometimes be perverse, and not what the superiors want at all.[1]

In this paper, I explore the connections between collective bargaining, governmental structure, and bureaucratic behavior in an analysis that centers on the public schools. While often not recognized as such, the public schools are simply government agencies, and indeed are among the most important and numerous government agencies in the country. The bureaucrats who do most of the schools' work—public school teachers—are heavily unionized and (outside a small number of right-to-work

[1] This is not to say that the unintended consequences are always negative. They may sometimes be positive—for example, in those cases when work rules and other aspects of unionization help to reduce turnover (see Freeman, 1986). Given the thrust of the current theory, however, which sees structure as a means of promoting the policy objectives of superiors, it is the negatives that most need to be recognized and dealt with.

states) typically engage in collective bargaining with their local school boards. Out of these negotiations come work rules intended to promote the rights and interests of teachers in the workplace, and prominent among them are rules that give teachers the right to transfer to schools they find desirable or to resist transfers to schools they find undesirable, depending on their seniority (Ballou, 2000; Riley, 2002).

To the uninitiated, teacher transfer rights may seem arcane and uninteresting. But within education systems that have such rules—and most districts of any size do—they are recognized as key components of the structure of public education. And increasingly they are becoming matters of political controversy. In this modern era of school reform, with districts under constant pressure to improve, superintendents and mayors of urban school systems are claiming that transfer rules make it impossible for them to allocate teachers productively across schools, and that such rules create a situation in which disadvantaged schools—those with high percentages of poor and minority students—find it harder to attract and keep high quality teachers. To the unions, transfer rules are benign structures that simply give teachers on-the-job prerogatives. But to political superiors they are structures with system-wide consequences that go well beyond the immediate benefits they bestow on teachers. In New York City, Philadelphia, and other big-city school systems, the battle lines have been drawn in just this way. The contenders are battling over bottom-up structure and its unintended consequences (Herszenhorn, 2004; Gootman, 2003; Keller, 2004).

To this point, there are no quantitative studies of the impacts of transfer rules. Do they, in fact, affect how the single most important educational resource—quality teachers—gets distributed across schools? And do these distributional effects mean that disadvantaged schools—the schools in greatest need of improvement—are further disadvantaged by making it more difficult for them to attract and retain high quality teachers? In the empirical analysis that follows, I will present evidence suggesting

that the answer on both counts appears to be yes. Transfer rules may seem to be a narrow, circumscribed way of providing benefits and protections to teachers. But in fact they have much broader consequences for the way governments are able to operate their schools.

The empirical analysis thus illustrates the general point I want to make here. Bottom-up structure can have important—and unintended—impacts on how policy gets implemented, and the established theory needs to be broadened to recognize as much.

Background

The public schools, like most government agencies, have traditionally been structured from the top down by their political superiors. Until the mid-1900s, the key structuring roles were played by state legislatures and school boards. Since then, the national government has gotten actively involved—through, for example, programs (with many rules) for compensatory and special education and the accountability requirements of No Child Left Behind. The courts have grown in importance as well, mainly through liberal interpretations of due process rights, by imposing mechanisms to promote racial balance, and by requiring new, more equitable systems of education finance (Wirt and Kirst, 2001).

Until the 1960s, there were virtually no unions in public education. But when the states began passing collective bargaining statutes for public sector workers—beginning with Wisconsin in 1959 and continuing into the 1970s—the unionization of teachers took off like a rocket, and by the early 1980s virtually all school districts of any size (outside the South) were unionized and subject to collective bargaining. The result was a new equilibrium in public education. Under the traditional system, power was mainly in the hands of public officials and administrators. Under the new system, substantial power had shifted to the teachers unions, whose money, manpower, and organization dwarfed those of administrators, and gave them the political wherewithal to select and influence many of the public

officials who held positions of authority. This new system has been stable for the last two decades, and the key role of teachers unions and collective bargaining is now fully institutionalized (Moe, 2001; Kahlenberg, 2006; Murphy, 1990; Lieberman, 1997; Loveless, 2000).

The unions' political power has top-down consequences for the public schools. They have used it to shape the content and direction of education policy, and they have been especially successful at blocking or weakening education reforms that they find threatening. The results show up in the structure of public education, as programs, regulations, and funding decisions find their expression in rules that constrain what school personnel can and cannot do (Moe, 2001).

Union power also generates bottom-up structure. It does this through collective bargaining, which leads to contracts that often run to more than a hundred pages, filled with rules that govern the workplace (e.g., Riley, 2002; Ballou, 2000). There are rules for pay, fringe benefits, and retirement. But there are also rules that, depending on the district, can cover virtually every aspect of what happens within schools, from the assignment and transfer of teachers to the number of minutes of teacher preparation time to the length of faculty meetings to the handling of parent complaints to the evaluation of teacher performance. Much of the structure of public schooling actually comes from below, not from above, and is a reflection of the power and interests of the employees who run the schools.

Expectations

When it comes to collective bargaining, teachers unions are very much like other types of American unions: they are fundamentally concerned about jobs. They do what they can to make member jobs as secure and well-paying as possible, to achieve better working conditions, to expand teacher rights and autonomy in the workplace, to increase the demand for teachers, and to push for higher spending (Kearney, 2000; Lieberman, 1997).

None of this has anything to do with what is best for children or schools, at least not directly or intentionally. Some union objectives, such as higher spending or lower class size, may have positive effects on academic performance—although research suggests that, if these factors do have such effects, they are weak and inconsistent (e.g., Hanushek, 2003) Some union objectives may have negative effects. Teachers unions go to great lengths, for instance, to ensure that even the most mediocre teachers do not lose their jobs. And they oppose efforts to test veteran teachers for competence in their subject matters, despite evidence that nontrivial numbers would probably fail if they were tested.[2]

To note the downside is not to indict the unions, because they are just doing their jobs. The point to be underlined, rather, is that when the unions push for economic benefits and workplace rules in their collective bargaining agreements, they are pushing for things that are in the best interests of teachers (and unions). And to the extent that these contracts serve as formal structures that shape behavior within the education system, we should not be surprised if there are sometimes negative consequences for children and schools—for their interests are not the same as those of teachers, and have little to do with why the rules are adopted in the first place.[3]

Rules that govern job transfers, both voluntary and involuntary, are often key provisions in these collective bargaining contracts, and common components of the bottom-up structure of schooling. The rights they give teachers, moreover, are very frequently acted upon. A recent study of contract rules in five urban school districts, for example, found that "40 percent of school-level vacancies, on average, were filled by voluntary transfers or excessed teachers over whom schools either had either no choice at all or limited choice" (Levin, Mulhern, and Schunck (2005, p.5). And this says nothing about the

[2] In 2004, to take one example, the Philadelphia school district succeeded (subsequent to a state takeover) in testing its middle school teachers for substantive competence, and two-thirds of its math teachers failed the math test (Keller, 2004).
[3] School boards (usually via hired administrators) do bargain on behalf of children and schools, but they can only limit what the unions are able to achieve—for were it not for union power, there would be no collective bargaining and no contract. It is important to recognize that school boards are not simply representing children and schools anyway, because the teachers unions are major forces in the politics of school board elections, and many board members are beholden to them (see Moe, 2003, 2006; and Howell, 2003).

frequency with which teachers use their contract rights to resist being transferred involuntarily out of the jobs they currently occupy.

Transfer rules reduce the discretionary authority of administrators over teachers. Thus, if administrators believe that a particular teacher has a background especially well suited to the children in a particular school—who have difficulty with English, say, or are from deprived homes—then transfer rules make it difficult to place the teacher in that school unless the teacher wants to go there or has little seniority. More generally, administrators are heavily constrained in their ability to allocate personnel in ways they believe are most conducive to student performance.

The allocation decisions are largely made by teachers. A teacher who finds herself in an undesirable school—where "undesirable" is defined by her own preferences—can transfer to another school if there is an opening (and she has enough seniority to do so). And a teacher who is asked to make an involuntary transfer from her existing school to a less desirable one can resist that request (if she has enough seniority) and stay where she is. Teachers largely distribute themselves across schools by making their own choices based on their own preferences.

Because there are two aspects at work here, one that gives teachers greater latitude in choosing their schools and another that makes the degree of latitude a function of seniority, the combination does more than weaken the hierarchy between administrators and teachers. It also creates a hierarchy among teachers. Those with lots of seniority have substantial choice over where they teach, but those who are newer to the district (and probably the profession) may have very little choice indeed, and may find themselves filling slots that senior teachers do not want. We should expect the distribution of teachers across schools to reflect this hierarchy. Senior teachers should be more likely to find jobs in schools that are desirable (to them), junior teachers should be more likely to wind up in schools that are undesirable

(to them)—and to the extent that teachers as a group tend to agree on which schools are desirable and which are not, this pattern should be all the more prominent and consequential.

What is it, then, that teachers are looking for when they make their choices? One thing that teachers prefer is higher salaries, of course. And salaries are important motivators when teachers are choosing among districts or when they are making entry and exit decisions that call for comparisons between public education and other lines of work (Ballou and Podgursky, 1997). While these are fundamental decisions indeed, teacher decisions about changing schools within districts cannot be explained (at least directly) by salary concerns, because salaries do not differ from school to school within the same district. What differentiates schools within districts is that they have different student bodies—racially, economically, academically—and different organizational characteristics, such as class size, enrollment, teacher collegiality, and the leadership qualities of the principal. Aside from more idiosyncratic considerations (like proximity to where the teacher lives), these are the grounds on which teachers are likely to assess the desirability of their options.

Hanushek, Kain, and Rivkin (2004) have conducted by far the most detailed study yet of teacher mobility and preferences, based on a data set that traces the occupational movements of individual teachers in Texas (a state that does not have collective bargaining). They are especially concerned with the importance of salary, a point of contention in the economics of education literature; and most of their analysis is about the decisions of public school teachers to exit public education entirely or to shift from one district to another. On these scores they find that, while salary does have a modest effect, "teacher mobility is much more strongly related to characteristics of the students, particularly race and achievement…" (p.326). When they do look at switching behavior within districts, where salary is irrelevant, they again find that student characteristics—race, achievement, and socioeconomic background—are significant factors in teacher preferences and mobility. Throughout, they apparently

consider only one organizational characteristic of the schools—class size—and find that it has no influence on how teachers make their choices.

If these findings are roughly correct in what they reveal about teacher preferences, they have important and troubling implications for the public schools. For they suggest that, to the extent that teachers are free to choose, they tend to avoid schools whose students are disproportionately minorities, economically disadvantaged, and low academic achievers, generating a dynamic of teacher mobility in which the very schools and students most in need of improvement are the ones least able to attract teachers. The upshot is that teacher preferences and teacher choice, if given scope to operate, threaten to reinforce problems of performance and equity that are deeply rooted in the American education system.

Even in the absence of transfer rules, then, disadvantaged schools should find it difficult to attract the teachers they want to the extent that the teachers have any choice in the matter—as they typically do, unions or no. But seniority rules are designed to expand teacher choice, and in so doing they are likely—without anyone intending it—to exacerbate the problems that disadvantaged schools face anyway. The consequences should tend to be felt by disadvantaged schools in distinctive ways that reflect the combined effects of seniority and choice. In particular,

(1) Because of transfer rules, disadvantaged schools should tend to lose more of their senior teachers than they would otherwise lose, leading them to rely still more heavily on teachers who are inexperienced in the classroom. The converse, of course, applies for advantaged schools.

(2) Because of transfer rules, disadvantaged schools should tend to have a harder time attracting and retaining teachers than they otherwise would; and thus, in order to fill out their staffing needs, should tend to rely still more heavily on teachers who are not fully certified or are in other ways less desirable. Again, the converse applies for advantaged schools.

Research connecting the organization of schooling to how much students learn is not definitive. But it does convincingly show that, aside from characteristics of the students themselves, the single most important determinant of student performance is the quality of teachers (Sanders and Rivers, 1996). It also convincingly shows that teachers in their first few years in the classroom—teachers who are inexperienced—are significantly less successful than other teachers, on average, at producing student achievement (Rivkin, Hanushek, and Kain, 2001). The research on teacher certification is less compelling. Some studies show that certification matters, some show that it does not (Darling-Hammond, et al., 2001; Darling-Hammond, 2006; Walsh, 2002). There is good evidence, however, that teachers who are certified to teach particular subjects like math or science are more successful at getting children to learn (Goldhaber and Brewer, 2000). And among close observers of public education—teachers, administrators, researchers, policymakers, parents—there is an almost universal belief that proper credentials matter, and that uncertified teachers tend to be lower in quality and less desirable on average. It is clear that schools and districts very much want certified teachers if they can get them.[4]

At the least, then, transfer rules can be expected to shape how different types of teachers get distributed across a district's schools, thus magnifying an already existing inequity: that the less desirable types of teachers are likely to wind up in disadvantaged schools and the more desirable types are likely to wind up in advantaged schools. These impacts further ensure that the kind of teaching that goes on in disadvantaged schools will not be the same as the kind that goes on in advantaged schools. There is also good reason to think that they have consequences for how much students learn, and that, because of transfer rules, students in disadvantaged schools are getting teachers of even lower quality than they would otherwise be getting.

[4] For typical discussions of teacher quality and the desirability of certified teachers, see, e.g. Sunderman and Kim (2005) and Berry (2005).

Modeling the Impact of Transfer Rules

In the empirical analysis to follow, the focus is on how transfer rules affect the distribution of teachers within districts, especially as it bears on schools at different levels of social advantage. The question to be addressed is whether the expectations above appear to be supported by the evidence.

In moving toward a test, we can begin by recognizing that the distribution of inexperienced and uncredentialed teachers across schools is likely to be influenced by a number of factors, and these factors need to be taken into account if the effects of transfer rules are to be partialed out. Moreover, because the focus is on school-to-school movements of teachers within districts, factors that are constant within districts cannot explain these movements (in the absence of interaction effects), so we need to identify important factors that can vary within the district context.

The data for this study are at the school level, so the main factors of interest here are the schools' characteristics—which, of course, can and do vary from school to school within districts. To keep things simple I will focus on four of these, each of which may plausibly have a role to play in explaining the distribution of teachers across schools.

(1) School Growth. The more a school's enrollment grows from year to year, the more likely the school will have to scramble to meet its teaching needs by adding slots and finding teachers to fill them, and the more likely it may be forced to rely on teachers who are less desirable.

(2) School Size. The larger the school, the less attractive it may be to teachers, because greater size allows for less collegiality, informality, and sense of community. It may also, as a larger and more complex organization, be less sensitive to the marginal effects of adding staff members who are low in quality.

(3) Class Size. This factor is relevant for two reasons, which happen to work in opposite directions. On the one hand, teachers tend to prefer smaller classes, so a school with larger classes may

have more difficulty attracting desirable teachers. On the other hand, larger classes also mean that a school has fewer slots to fill, and this may make it easier to meet its staffing needs with qualified people. (For testing purposes, these can be treated as two separate directional hypotheses.)

(4) Disadvantage. Schools whose students are disadvantaged tend to be less attractive to teachers, as we've discussed. This does not mean that teachers are racists or hard-hearted. More likely, it means that many teachers try to avoid the academic and behavioral problems that can go along with teaching disadvantaged children. In any event, various kinds of student-related disadvantages may be relevant to teacher choice, and thus, in principle, may serve as independent variables in our analysis. Children may be disadvantaged because they minorities, for example, because they come from low-income families, or because their academic performance is low, and teachers may put greater weight on some disadvantages than others in making their choices. These aspects of disadvantage are highly correlated with one another, however, and they essentially constitute a syndrome: schools that have high percentages of minority students also have high percentages of students on free lunches (the standard measure of low family income) and high percentages who do poorly on academic tests. To simplify, I will use a school's percentage of minority students (African-Americans and Latinos) as a measure of its level of disadvantage.[5]

Unlike the variables listed above, transfer rules cannot have a direct impact on the variation of teacher types across schools, because these rules—and the collective bargaining contract as a whole—are the same for all schools within a given district. They can have an indirect impact, however, by altering the effects of the other variables. Most obviously, if a school's level of social disadvantage has an impact on its percentage of low quality teachers, then we would expect this impact to be greater in

[5] Were low academic performance to be used here as a measure of disadvantage, it would be problematic as an independent variable because it is clearly endogenous: a school's low academic performance may help explain why it fails to attract quality teachers, but a lack of quality teachers is surely a major reason that its kids are learning so little in the first place. Using percent minority as a proxy for disadvantage avoids this endogeneity problem.

districts with transfer rules than in districts without them—because transfer rules expand the choices of senior teachers and give them more freedom to avoid schools they find undesirable. It is plausible to argue, moreover, that transfer rights may also interact with school size and class size—because these factors, like a school's level of disadvantage, are reflections of possible teacher preferences, and their impacts may thus be magnified by the presence of transfer rights. Indeed, it is even possible that transfer rights could interact with the growth variable as well—not because it is a reflection of teacher preferences, but because the rigidities built into the staffing process by transfer rights may make it more difficult for schools to respond to growth by hiring qualified staff, resulting in heavier reliance on teachers who are inexperienced or uncredentialed.

Now let's construct a simple model to capture the influence of all these factors on the distribution of teachers across a district's schools. As a conceptual matter, it makes sense to begin by recognizing that, when teachers are choosing among schools within a given district, they are comparing those schools to one another and making judgments specific to that context. Thus, while a school with 20% minority students might be considered a high minority school (and thus an unattractive choice) in a district where the median school has only 5% minority students, it might be considered a very low minority school (and thus an attractive choice) in a district where most children are minorities. This is true for the other school variables as well: whether their values make a school attractive or unattractive to teachers depends on how the other schools in the same district are faring on these counts. A reasonable way to model this situation, along with the interaction effects associated with transfer rules, is as follows:

$$(L_{ij}-L^{j}) = \beta_{0j} + \beta_1(G_{ij}-G^{j}) + \beta_2(E_{ij}-E^{j}) + \beta_3(C_{ij}-C^{j}) + \beta_4(M_{ij}-M^{j}) + \varepsilon_j + \varepsilon_{ij} \qquad (1)$$

$$\beta_1 = \alpha_1 + \alpha_{11}T_j \quad (2)$$

$$\beta_2 = \alpha_2 + \alpha_{22}T_j \quad (3)$$

$$\beta_3 = \alpha_3 + \alpha_{33}T_j \quad (4)$$

$$\beta_4 = \alpha_4 + \alpha_{44}T_j \quad (5)$$

In this formulation, the subscript i is a counter for schools and the subscript j a counter for districts. (I will not introduce lags at this point.) For each school, low teacher quality (L) is expressed as a function of school growth (G), school enrollment (E), class size(C), and percent minority (M), and each school variable is entered into the equation as a deviation from the relevant district median, represented by the district superscript j. Each district also has its own intercept, β_{0j}, to allow for unmeasured contextual effects—that certain districts may attract certain types of teachers, have especially bad or good schools compared to other districts, and so on. Equations (2)-(5) allow the impacts of each of the school-level variables to vary as a function of transfer rules (T), which are common for all the schools within a given district. When the latter relationships are incorporated into (1), the equation can be expressed as

$$(L_{ij}-L^j) = \gamma_{0j} + \gamma_1(G_{ij}-G^j) + \gamma_2(E_{ij}-E^j) + \gamma_3(C_{ij}-C^j) + \gamma_4(M_{ij}-M^j) + \gamma_5(G_{ij}-G^j)T_j + \gamma_6(E_{ij}-E^j)T_j + \gamma_7(C_{ij}-C^j)T_j + \gamma_8(M_{ij}-M^j)T_j + \varepsilon_j + \varepsilon_{ij} \quad (6)$$

where the γ's are functions of the original α's and β's. This model captures the logic of the situation. It recognizes that, however different the districts may be from one another—some may have no low quality teachers, some may have a lot, some may have few minorities, others may have many, and so

on—the distribution of teachers within a district depends on how its schools compare to one another on factors of relevance.

This logic is central to the problem at hand, and the exercise above helps to drive home the point and illustrate it formally. Equation (6), however, contains many factors that are constant within districts. And when, after a bit of algebra, these are factored out and collected under a new district-specific intercept, η_{0j}, equation (6) reduces to

$$L_{ij} = \eta_{0j} + \gamma_1 G_{ij} + \gamma_2 E_{ij} + \gamma_3 C_{ij} + \gamma_4 M_{ij} + \gamma_5 G_{ij} T_j + \gamma_6 E_{ij} T_j + \gamma_7 C_{ij} T_j + \gamma_8 M_{ij} T_j + \varepsilon_j + \varepsilon_{ij} \qquad (7)$$

which does not require that variables be differenced from their medians. Thus, although (7) gives the surface impression that intra-district comparisons across schools are not captured in the model, it is equivalent to a model that does so explicitly, and it yields statistical results that are identical.

The analysis that follows, then, is concerned with estimating the coefficients in equation (7). The estimation is primarily concerned, of course, with whether transfer rules magnify the effects of other variables on the distribution of low quality teachers, and thus with whether the estimated coefficients of the interaction terms (γ_5 through γ_8) reveal significant impacts. Given the existing literature, however, there is good reason to think that a school's level of disadvantage will dominate other school-level variables in its impact on teacher quality, and thus that what really matters here is whether transfer rules magnify the extent to which high minority schools are burdened with low quality teachers. The coefficient of greatest interest, then, is γ_8. The key question is whether $\gamma_8 > 0$, and whether it is large enough to be of substantive importance.

Data

The data on transfer rules are derived from a 1999 random sample of California school districts, in which (as part of a larger project) collective bargaining contracts were collected and coded from 374 districts. California is a useful state to study because it is a large, diverse state and its school districts are similarly diverse—large and small, urban and rural, conservative and liberal, high minority and low minority—providing a good cross-section for analysis. Moreover, although California's schools are almost totally unionized, with only the tiniest districts (typically those with just one or two schools) having no collective bargaining, there is considerable variation across districts in the existence and strength of transfer rules, and this provides a good opportunity to study the connection between transfer rules and the behavior of teachers.

From the standpoint of representativeness, perhaps the greatest concern is that California's teachers may have somewhat different preferences than teachers in other states and may not be typical. In particular, if California teachers were (say) more liberal in their attitudes toward disadvantaged students than teachers in other states, then transfer rules may not lead to a situation in which more teachers flee disadvantaged schools. In the absence of additional research, we cannot say how California teachers compare to their colleagues elsewhere. But if the empirical findings in this analysis turn out to be similar to those of Hanushek, Kain, and Rivkin (2004), who studied teachers in Texas—a very different cultural setting indeed—then we can have some confidence that teacher preferences may not differ much across states.

The analysis is carried out on a subset of the original sample of California of school districts. This is because, in order to understand how transfer rules affect the movement of teachers across schools, it is necessary to focus on settings in which mobility is both possible and meaningful. There is little sense, for instance, in lumping elementary schools and high schools in the same analysis, because teachers rarely transfer across levels. Elementary teachers move to other elementary schools, high

school teachers to other high schools. In this paper, the focus is restricted to elementary schools, as they far outnumber high schools (and middle schools) and offer more variation to work with. All districts without elementary schools are therefore excluded. Also, of the remaining districts, I exclude those that have fewer than four elementary schools to ensure that the districts we are studying provide contexts in which teachers can genuinely be mobile and act on their preferences. These constraints reduce the number of eligible districts from 374 to 158.

The dependent variable is the low quality of each school's teaching force. It is measured as the proportion of teachers in the school who are either inexperienced (teaching for less than three years) or not fully credentialed. In principle, each of these measures could usefully be taken as the basis for a separate analysis, but in practice the overlap between the two is substantial: in 1999-2000, for example, 56% of unaccredited teachers were inexperienced and 52% of inexperienced teachers were unaccredited. This being so, it makes sense to combine the two into one overall proxy.[6]

Transfer rights are coded in the following simple way. Voluntary transfers and involuntary transfers are each given a score of 1 if the contract requires seniority to be the overriding factor in teacher transfers, and 0 otherwise. The two scores are then added to yield the final coding, which takes on the values 0, 1, or 2.

The other variables are straightforward and measured as follows.[7]

-- School size: the natural log of school enrollment.

-- School growth: the percentage increase or decrease in school enrollment over the past year.

-- Class size: the school's average class size in grades 4-6.[8]

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[6] The data are from the California Department of Education PAIF data sets on teachers, which are part of the California Basic Educational Data System (CBEDS). The CBEDS web site is www.cde.ca.gov/ds/ss/cb. When the analysis is carried out separately for the inexperience measure and the credentials measure, the results for each are very similar to those presented for the combined measure, and the substantive and statistical conclusions are the same.

[7] Except for class size, all data are from the California Department of Education CBEDS Public School Enrollment and Staffing Data Files. The data on class size are from the Academic Performance Index Data Files, which can be found on the web at www.cde.ca.gov/ta/ac/ap/index.asp.

-- Disadvantage: the percentage of minority students in the school, with African-American and Latino students counted as minorities.[9]

I will take the 1998-99 school year as the base year, because all the collective bargaining contracts were in force then. Transfer rights and the other independent variables are thus measured in that same year, with growth measured as the change in enrollment from 1997-98 to 1998-99. It is reasonable to suggest, however, that the independent variables should tend to affect the distribution of teachers with a time lag. Class size in year t, for instance, is a signal of school attractiveness that likely affects teacher choice about where they want (or do not want) to teach in year t+1, which in turn shapes the distribution of teachers across schools in that year.

A plausible approach, then, is to measure the teacher quality variable in 1999-2000 to allow for a one year lag. I am going to modify that a bit here, because the specific factors we are dealing with—the percentage of inexperienced teachers, the percentage of teachers who are uncredentialed—sometimes fluctuate quite a bit for individual schools, mainly because elementary schools typically do not have large staffs (a school with 400 children, for example, may have just 20 teachers), and small changes in the numbers of inexperienced or uncredentialed teachers can translate into relatively large percentage changes from year to year. In view of this, we can get a better measure of the dependent variable, while still retaining the lagged nature of the relationship, by taking the two-year average for 1999-2000 and 2000-2001.

There are reasons, finally, to constrain the sample at the margins in order to ensure that there is sufficient variation to explain. Some districts, for example, have near-zero levels of inexperienced and uncredentialed teachers, and when this is the case there can obviously be little or no variation across

[8] California groups the data this way. It also provides data on average class size for grades 1-3, but these figures do not vary much across schools.

[9] I also include Native American students (who are present only in very small numbers) as minorities, because their situation is similar to that of Latinos. Asians are not counted as minorities because they typically do better in school than whites.

schools for the model to explain. A reasonable solution is simply to exclude these districts and focus on those in which there is room for variation. I will do that by constraining the estimation to include only those districts in which the median school has a score of at least .05 on our proxy measure of low quality teachers.

Of the independent variables, only one involves a similar problem of any practical relevance: the disadvantage variable. Some districts have almost no minorities, some are almost totally minority. In these districts, there can be little or no variation across schools in the variable that is of greatest interest to us, and no basis for judging whether transfer rules magnify its effects. What we need are districts in which the percentage of minority students can vary by meaningful amounts across schools, so that we can see whether such variation affects the distribution of teachers. Here too, a reasonable solution is to exclude districts at the extremes. To ensure that the variation is meaningful enough to be relevant to teacher choice, I will include only those districts in which the median school has more than 15 percent or less than 85 percent minority students.

When these additional constraints are imposed on the sample, the estimation is carried out on 115 districts and 1588 schools.[10] Descriptive statistics for the main variables are set out in Table 1. The average school in the sample has 602 students, 49% of whom are minorities; it has 31.6 teachers, 20% of whom are low in quality (by our proxy measure); it has an average class size of 29.4; and it grew about 1% from 1997-98 to 1998-99. Except for class size, however, all of these school-level variables have rather large standard errors relative to their means, indicating that the school population we are studying here is quite diverse—a good thing from an analytical standpoint. Diversity is also apparent in the

[10] Because the point of the constraints is to allow for a more appropriate sample and analysis given the questions at hand, we should expect that the analysis would lead to different results were the constraints not imposed, and it does—but the differences are not great. Without the constraints, estimation simply leads to a slightly weaker version of the results I will describe in the following sections. The patterns are the same and the transfer rights variables remain significant, but their estimated impacts are somewhat smaller and their significance levels are slightly lower.

district-level characteristic we are concerned with: the transfer rights of teachers. The average district has a score of 1.05 on the transfer rights measure, but this hides substantial variation. In fact, 40 districts have no seniority-based transfer rights (a score of 0), 27 have these rights with regard to either voluntary or involuntary transfers (a score of 1), and 47 have them on both counts (a score of 2).[11]

Basic Findings

To promote confidence in the results, I carry out the estimation in two different ways. The first simply applies linear regression to equation (7). It also recognizes, however, that even in a (fixed-effects) model that allows each district to have its own intercept, as equation (7) does, the error terms for schools may still be correlated within districts, which would violate the usual OLS assumptions. Accordingly, the regression analysis uses a robust (Huber-White) estimator of variance, which does not make OLS assumptions about the errors and explicitly recognizes the clustering of schools within districts in its calculation of standard errors and t-scores.[12]

The second approach relies on blocked (grouped) probit. The rationale for doing so is that, for our data, the dependent variable is a proportion that is bounded in the aggregate between zero and one and destined to be nonlinear as values approach either of the bounds.[13] Here too, we have to expect that

[11] Note that the transfer rights variable measures whether a district's collective bargaining contract makes seniority an over-riding criterion in determining how these rights are exercised. Even districts that score 0 on this measure, however, may have transfer rights of some sort specified in their contracts—they just do not require that seniority must override the other criteria.

[12] Specifically, the analysis is carried out in STATA using the areg command (which automatically introduces fixed effects) with clustering.

[13] In blocked probit, the proportion is viewed as the number of "successes" (low quality teachers) in a given number of trials (total teachers in the school). The model essentially reinterprets equation (7) as an individual-level specification in which L is a continuous and unbounded measure of a teacher's low quality, and the independent variables for each school (its percent minority, etc.) are linear predictors of low quality. The cumulative normal distribution is applied to this underlying linear model to create a nonlinear model of the probability that a teacher at a school with the given characteristics will be low in quality, and this probability function is used in the familiar binomial formulation to model the proportion of "successes" in n trials. See, e.g., Powers and Xie (2000). The coefficients that are being estimated with probit are the same as those set out in equation (7)—although, of course, probit will yield somewhat different estimates than linear regression. The logic I outlined earlier, moreover, which used the linear equations leading up to equation (7) to explain why it is unnecessary to compare schools to their district medians, still applies to the probit model even though it is ultimately nonlinear. The reason is that the

errors within districts will be correlated, so robust standard errors and adjustments for clustering are called for. But the form of the probit model, given the nature of our dependent variable, is probably more appropriate than that of linear regression, and we should be inclined to give more weight to its results if the two conflict.

I begin the analysis by estimating a Base Model that omits the effects of seniority-based transfer rights and simply shows the impacts of school growth, school size, class size, and percent minority on the distribution of low quality teachers across a district's schools. The results are set out in Table 2. The regression and probit results are quite similar, showing that the proportion of low quality teachers in a school does indeed appear to increase with the school's size, its recent growth, and its minority composition. The impacts of all three variables are statistically significant, and all are in the expected direction. Class size appears to have little effect, consistent with the findings of Hanushek, Kain, and Rivkin (2004).

To compare impacts across variables, we can ask: how much does a school's proportion of low quality teachers change as each independent variable shifts from a low value (one standard deviation below its mean) to a high value (one standard deviation above)? The most direct way of expressing this change is simply in terms of the predicted change in the proportion. But we can get a better sense of whether this change is "big" or "small" by comparing it to the typical proportion of low quality teachers in the sample (its mean) and to how much the proportion tends to vary across schools (its standard deviation). In Table 2, all three of these impact measures are presented for each variable.

These calculations show that, as the literature leads us to expect, the minority makeup of the school has a major impact on the proportion of low quality teachers, an impact that is far greater than those of the other factors. Consider the probit results. When a school shifts from largely white to

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linear equations are actually at the heart of the nonlinear probit model. Regardless of whether the variables in the probit equations are measured as departures from their medians, the statistical results are identical.

largely minority, the proportion of low quality teachers (ΔP) goes up by .12. This change is obviously much larger than those associated with growth (.03), school size (.03), and class size (-.01). But it is also substantial relative to what is "normal" for schools in general. In the average school about 20 percent of the teachers are low in quality, so an increase of .12 represents a boost of more than half that much, which is quite a large increase in relative terms. Similarly, a shift of .12 is a big one relative to how much the proportion of low quality teachers normally varies across schools, representing an increase of .96 standard deviations. Overall, the estimates of the Basic Model square nicely with the findings of Hanushek, Kain, and Rivkin (2004): it is a school's level of disadvantage that matters most in explaining teacher choice and mobility.

The next step is to explore the effects of union transfer rules. This is done by introducing interaction terms into the Basic Model and determining whether the transfer rules alter the effects of the other variables. The results are set out in Table 3. They show that the effects of transfer rules are not statistically significant for growth, school size, and class size. But they also show that transfer rules do have an important role to play in magnifying the effects of the very factor that teachers are most responsive to: the school's level of social disadvantage.

In the probit analysis, the impact of a school's minority composition on its proportion of low quality teachers is estimated to increase by .09 as a result of strong transfer rules. This transfer-rule effect is calculated as follows. In districts where transfer rules are the least constraining (coded as 0, in other words), a shift in the school's minority composition from mainly white to mainly minority leads to an estimated increase of .07 in the proportion of low quality teachers (which I've listed in the table as the baseline ΔP impact associated with the Minority variable). In districts where transfer rules are at their most constraining (coded as 2), however, this same shift in minority composition leads to an increase of .16 in the proportion of low quality teachers (not shown in the table). The difference

between the two impacts is .09, which represents the impact of transfer rules, and measures the extent to which they boost the effects of minority composition. (Thus, a ΔP of .09 is the impact associated with the interaction term Tran*Minority in the table.)

By reference to what is normal for the sample as a whole, the impact of transfer rules is considerable. It generates an increase in the proportion of low quality teachers that is almost half as large as the mean, and equal to .73 standard deviations of change. But we can also put this impact in the most concrete of terms. The average school in the sample has 31.61 teachers, with .20 of them either inexperienced or unaccredited (Table 1). So the average school has 6.32 teachers classified as low quality. The probit results in Table 3 show that, absent the effects of transfer rules, disadvantaged schools have a proportion of low quality teachers that is .07 higher than that of advantaged schools—which translates into 2.21 teachers. Thus, in districts without transfer rules, the typical disadvantaged school has about 7.43 low quality teachers, the typical advantaged school has about 5.22, and the former therefore have about 42% more low quality teachers than the latter do. When transfer rules are strong, however, this asymmetry is heightened dramatically. Disadvantaged schools get a proportion of low quality teachers that is an extra .09 higher than that of advantaged schools—which translates into a difference of another 2.84 low quality teachers. As a result, the typical disadvantaged school in these strong-transfer-rights districts has about 8.85 low quality teachers (about 28% of its 31.61 teachers), while the typical advantaged school has about 3.79 low quality teachers (about 12% of its 31.61 teachers)—meaning that the disadvantaged schools in these districts have more than two times as many low quality teachers as the advantaged schools have.

The estimation thus far points to two general conclusions. The first is that disadvantaged schools have greater difficulty than advantaged schools in getting quality teachers to work for them. The second is that they have considerably more difficulty—and fall much farther behind the advantaged schools in

the quality of their teachers—when their districts have strong transfer rules that give teachers greater latitude in choosing where to work. Estimated impacts that, on the surface, may seem to be small—like shifts of .09 in the proportion of low quality teachers—are actually quite potent in the asymmetries and inequities they introduce among schools.

Controls

Given the structure of this analysis, in which the transfer rule variable appears in interaction terms only and not as a direct determinant of the dependent variable, it is difficult to introduce district-level controls—meaning, other district-level variables that might account for some of the influence we are attributing to transfer rules—without getting tangled up in complications. Any district-level control variables would have to appear in interaction terms too; there would be a proliferation of these terms; and they would threaten to be highly correlated, both with one another and with the main effects, producing multicollinearity problems.

Here and in all analyses, however, the challenge is not to control automatically for a laundry list of variables that have no logical reason to be there, but rather to include only those variables that are relevant. We have solid theoretical reason for believing that transfer rules ought to have the effects we've observed: they give teachers more latitude in the pursuit of their own preferences. Can a good theoretical case be made for other variables that might account for the impacts we've associated with transfer rules?

There are two possible controls that many observers of the public schools may regard as worthy of attention, the size of the school district and its degree of bureaucratization, because both tend to be associated in the education literature with strong teachers unions.[14] Even so, there is no compelling

[14] Much of this is anecdotal. While there are good accounts of the political power exercised by urban teachers unions (e.g., Henig et al., 1999), there is no good quantitative evidence that teachers unions are actually more powerful in large or

logic that links them to the distribution of teachers across schools. The best we can do is weave plausible stories. For example, it is plausible to think that small districts operate more like communities in which people know one another, inequities are more obvious and less acceptable, and it is easier to ensure that disadvantaged schools do not get stuck with the worst teachers. It is also plausible to think that, because heavily bureaucratic systems (whether in education or not) tend to give formal advantages to senior employees, it might be bureaucracy, not union transfer rights per se, that accounts for the flight of quality teachers from disadvantaged schools.

On the other hand, we could just as well argue that large, bureaucratic systems—precisely because they are more complex, impersonal, and formal—are more likely to have rules ensuring that all schools within the district are treated the same (at least in certain basic respects). The bottom line is that district size and bureaucracy may have something to do with the distribution of teachers across schools, although we cannot be sure what impacts they might have.

The same is true for a perennial control that is almost always a prime candidate in the empirical analysis of social behavior: the education level of the population. It is possible that, when parents or residents in a school district are well educated (on average), they are more politically active and insist on well-run systems that allocate teachers productively and equitably across all schools. On the other hand, it may also be that well educated parents mainly care about getting good teachers for their own neighborhood schools, and actually favor a system in which good teachers leave disadvantaged schools for advantaged ones. Indeed, perhaps what really matters is not the average level of education in a district, but its variance—and that the more a district is made up of both well educated and poorly educated residents, the more the former will use their clout to see that the district's resources are unequally distributed in their favor.

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bureaucratic districts. A recent study, based on interviews with (winning and losing) school board candidates, suggests that teachers unions are probably just as successful in smaller, less bureaucratic districts. See Moe, 2003.

It is not clear, then, if or exactly how these variables come into play.[15] But they are the most obvious factors to control for, and I will take them into account here in order to see if they make a difference. They are measured as follows:[16]

-- District size: the natural log of the district's total elementary school enrollment, 1998-99.

-- Bureaucracy: the ratio of total district spending on administrative personnel to total district spending on teachers, 1998-99.

-- Education Level: the percentage of the district adult population with a college education, from the 2000 Census.[17]

-- Education Variance: a measure of the extent to which education levels vary within the district adult population, also from the 2000 Census.[18]

In the analysis of the previous section, we found (as expected) that a school's proportion of low quality teachers is primarily shaped by its level of social disadvantage, and that transfer rules affect teacher quality by magnifying the effects of social disadvantage. The question before us now is whether transfer rules continue to play such a role when the four control variables are introduced into the

[15] The empirical case is not strong either, at least on the surface. While the power of teachers unions may be correlated with district size and bureaucracy (although this has never been shown), our analysis is simply about seniority-based transfer rules, which are fairly common in districts of all sizes. The correlation between transfer rules and (log) district size in our sample is actually just .09. The correlations between transfer rules and the other district-level controls are also low: .03 for bureaucracy, .15 for education level, and .00 for education variance.

[16] Data on district size come from the California Department of Education CBEDS data set, discussed earlier. The spending data that define bureaucracy come from the California Department of Education J-series data for 1998-99, located on the web at www.cde.ca.gov/ds/fd. The data on education are from the National Center on Education Statistics' census data set, which maps census data onto school districts. It can be found on the web at nces.ed.gov/surveys/sdds/selectgeo.asp.

[17] I could have used the mean education level in the district, which can be constructed by attaching numeric values to ordinal categories of education (less than high school, high school grad, etc.) and weighting them by the percentages of adults in each category. For lack of better alternatives, this approach was used to construct the variance (see the next footnote). But the measure I've used instead to capture the overall level of education—the simple percentage of adults with a college education—does not require us to treat an ordinal scale as an interval one (which is nice to avoid, when possible), and in fact provides a somewhat better fit in the regression and probit analyses.

[18] Education levels are coded as follows: less than high school=1, high school grad=2, some college=3, college grad=4, post-college degree=5. The variance is constructed in the usual way, using these numeric values and the percentages of district adults in each of the five categories.

analysis—each of them interacted with the school's level of disadvantage, and thus allowed to compete with transfer rules for influence.[19]

The results, set out in Table 4, are similar for regression and probit.[20] Most importantly, they show that transfer rules do continue to magnify the effects of social disadvantage, despite the presence of multiple controls. Interestingly, the results also show that, although district bureaucracy and the variance of education levels among its citizens are not of any consequence, the size of the district and its general level of education appear to be quite consequential indeed—and that, in the presence of these controls, the impact associated with transfer rules is smaller than the earlier analysis suggested, although it remains quite significant both statistically and substantively.

From the probit analysis, we find specifically that when a school's minority composition increases from low to high, its impact on the proportion of low quality teachers is estimated to increase by .05 as a result of strong transfer rules—down from the previous section's estimate of .09, but still a fairly large effect, equal to a shift of .38 standard deviations. We can also put this in more concrete terms. In districts without transfer rules, it can be shown (using the same sorts of calculations employed in the prior section) that disadvantaged schools have an average of 6.95 low quality teachers, while advantaged schools have an average of 5.69, which means that the former tend to have about 22% more low quality teachers than the latter. When transfer rules are strong, by contrast, disadvantaged schools have an average of 7.74 low quality teachers and advantaged schools have an average of 4.90, which

[19] To keep the model simple and focused, and to avoid a debilitating proliferation of interaction terms, I will not include interactions linking all these variables to growth, school size, and class size as well. In any event, there is no theoretical basis for thinking that the analysis needs to be expanded in this way.

[20] The coefficients in Table 4 are not as straightforward to interpret as those in the earlier tables. In particular, while the coefficient of the percent minority variable is negative, the total impact of an increase in minority composition on teacher inexperience is actually positive—because the total change includes the changes associated with all its interaction terms, and the sum of these changes is always large and positive compared to the negative starting point. Just how positive the final impact is depends on the values taken on by the transfer rule, district size, bureaucracy, and the education variables, and these can vary. This is why, in the impact columns of Table 4, I have not calculated impact coefficients for the minority variable itself. At this point, we do not really care about these numbers anyway. What we care about are the impacts of the district-level variables, and especially how the impacts of transfer rules hold up in the presence of controls.

translates into a difference of 58%: a considerable increase in the burden that disadvantaged schools must bear.

I will not go into detail discussing the impacts of district size and the education level of its citizenry, as we are not interested in these factors except as controls, and we do not have any clear theoretical expectations about how they should operate. The findings, however, are provocative. They suggest, first, that the teaching problems plaguing socially disadvantaged schools are greater in large school districts, and thus that there is something about district size that seems to be bringing this about. It is unclear what that something is. It may have to do with the many factors, from coordination problems to the impersonal nature of relationships, that make large districts difficult to manage and govern. It may also be that large districts tend to have politically powerful unions whose impact on the distribution of teachers goes well beyond that of the transfer rules we are focusing on here, and thus that the large-district effect is really another variant of the union effect. But whatever phenomenon we are observing here, its impacts are impressive and well worth exploring in future research. This is all the more true because most of the nation's disadvantaged children are to be found in large districts, and it is in these contexts that the distribution of teachers is especially skewed against them.

The education effect is also intriguing. By these estimates, there is no evidence that educated citizens use their clout to get the better qualified teachers for their own schools, or at least that this is the predominant effect of education. The evidence suggests, to the contrary, that high levels of education have what amounts to a "good government" effect on the way the district is run. Quality teachers in high-education districts are spread more evenly across the district's schools, and disadvantaged schools and their students are treated more equitably. As in other realms of politics and government, an educated citizenry seems to have positive effects. More research is clearly needed, however, to determine if this result holds up.

Are There Compensating Effects at the District Level?

In the presence of controls, transfer rules still work as we ought to expect: they make it more difficult for disadvantaged schools to get quality teachers. There is a bigger picture, however, that is worth considering. Even if it is quite true that, because of their within-district effects, transfer rules create problems for disadvantaged schools, they may also be having effects across districts that make these problems less severe or even eliminate them.

In particular, it may be that teachers see districts with strong transfer rules as more desirable places to work, and that these districts are better able to keep their experienced teachers and to attract teachers from elsewhere as a result. It this were so, districts with strong transfer rules would tend to have proportionately fewer low quality teachers than other districts do. And even if good teachers were inequitably distributed within these districts, the higher average level of quality would serve to compensate, wholly or partially, for the within-district inequities.

This is a reasonable argument that can briefly be put to the test here. It is not practical at this point to go on at great length about the model, so let me just propose the following variables as possible determinants of the distribution of low quality teachers across districts. All are measured in 1998-99 unless otherwise indicated.[21]

-- District elementary enrollment growth, 1997-98 to 1998-99: the higher a district's growth, the greater its difficulty hiring quality teachers.

-- District size, measured as in Table 3: could have effects either way.

[21] All data are from the California Department of Education's CBEDS data files, except for (1) my own data on transfer rules, (2) the data on teacher salaries, total spending, and bureaucracy, which are from the Department's J-series financial data files, and (3) the data on the education level of the district population, which are from the National Center on Education Statistics' Census 2000 School District Demographics Data Files. All sources are discussed in earlier footnotes.

-- Median size of the district's elementary schools (logged): the larger school size, the less attractive the district and the greater its difficulty hiring good teachers.

-- Median class size in the district's elementary schools: could have effects either way.

-- Median percent minority in the district's elementary schools: the more disadvantaged a district's schools, the greater its difficulty hiring good teachers.

-- Teacher salary (logged), measured as the salary associated with "Bachelor's degree plus 30 units" (a standard salary category): the higher a district's salaries, the less its difficulty hiring good teachers.

-- Teacher work days, measured as number of "service days" in the year: the more work days a district has, the less attractive the district and the greater its difficulty getting quality teachers.

-- Bureaucracy, measured as in Table 4: could have effects either way.

-- Total spending per student (logged): the higher the spending, the more attractive the district and the less its difficulty getting quality teachers.

-- Urban location, measured as a "large" or "medium" city according to NCES data: by comparison to rural districts (the omitted category), urban districts are likely to have an easier time attracting quality teachers.

-- Suburban location, measured as "fringe" of large or medium city according to NCES data: same logic as urban.

-- Education level of district population, measured as the percent of adults who have at least graduated from college: the more educated its population, the less difficulty a district should have in attracting quality teachers.

-- Elementary district (which only contains elementary and possibly middle schools), as opposed to a unified district (which contains elementary, middle, and high schools): could go either way.

-- Transfer rules, measured as before: if the theory is correct, we would expect districts with strong transfer rules to find it easier to attract high quality teachers.

In our earlier analysis of how teachers are distributed within districts, the main variables were at the school level. Any district-level variables (because constant within districts) were only relevant to the extent that they altered the effects of the school-level variables, and they came into play only through interaction terms. In this case, things are much simpler. This is a district-level analysis, all the variables are at the district level, and all can readily be modeled as having direct effects on the distribution of teachers across districts.

The question that concerns us is: when other factors are controlled, do transfer rules have the effect of reducing a district's proportion of low quality teachers? The results of the estimation are set out in Table 5.[22] Both the regression and the probit models lead to the same conclusion: the presence of strong transfer rules has no effect on the distribution of low quality teachers across districts. The notion that districts with stronger transfer rules have an easier time attracting and keeping quality teachers, and thus that the problematic effects of transfer rules within districts are actually reduced or eliminated by positive effects across districts, is not borne out by the data. The likelihood that this analysis is on target is bolstered by its striking corroboration of the main finding of Hanushek, Kain, and Rivkin (2004): that a district's level of social disadvantage is by far the most powerful determinant of how teachers distribute themselves across schools: the more disadvantaged the district, the greater its proportion of low quality teachers.

It is still possible, I should emphasize, that some of the other things unions do might have positive effects on the distribution of teachers. Unions push for higher benefits and job security and for training and professional development programs, and these efforts may translate into higher teacher

[22] Note that that this analysis has the advantage of being carried out on a larger number of districts (270), because the sample-reducing constraints imposed on the within-district analyses need not be imposed here. The only constraint is that the districts must contain elementary schools. High school districts are therefore excluded.

quality. They are also likely to be very attractive to teachers. It is at least plausible to argue, then, that districts with strong unions may find it easier to attract, keep, and train better teachers overall, thus raising average teacher quality and helping to compensate—although perhaps just partially—for within-district inequities.

But even if true, this is no argument for transfer rules. The presence of transfer rules generates significant quality and equity problems within districts, and these problems are not mitigated by any cross-district effects of the transfer rules themselves. Thus, whatever else the unions may do, and whatever the effects of these activities may be, the unions' total impact on schools and children would be more positive (or less negative) if transfer rules were simply eliminated.

Conclusion

Political scientists are fond of saying that "institutions matter." But what this claim usually comes down to, although it is not nearly so quotable, is that structure shapes behavior. The structure of government agencies is an important subject of political analysis, and it is something well worth explaining, precisely because it affects the way government personnel behave in the implementation of public policy. The positive theory of public bureaucracy is ultimately about all of this. It is an effort to explain where the structure of government comes from and why it takes the forms it does, and it attempts to use these as a foundation for understanding governmental—and thus mainly bureaucratic—behavior.

As the theory has developed thus far, it is largely about the top-down imposition of structure by political superiors. Faced with bureaucrats who may disagree with them on policy and who are advantaged by private information, superiors use rules and procedures in an effort to ensure that agencies do what they are supposed to do. At least some portion of bureaucratic structure, however,

cannot be explained in this way. It emerges from the bottom up through collective bargaining, it is driven by the organized power of ordinary bureaucrats rather than by their information power, and it results in work rules that are intended to promote their occupational interests rather than to have any specific effects on implementation or policy—although the unintended consequences for the latter may be quite significant. When this happens, as we should expect in a world in which public sector unions are well organized and politically powerful, the theory is overlooking an aspect of structure that is essential for understanding the way government operates.[23]

This paper's analysis of the public schools illustrates as much. Union power and collective bargaining are clearly responsible for much of the workplace organization of the public schools, and there is good reason for thinking—because we need only believe that structure shapes behavior—that inch-thick union contracts brimming with rules, regulations, and procedures cannot help but affect what goes on inside the schools. I have focused here on just one component of the schools' bottom-up structure, albeit one that is exceedingly common: the transfer rules that allow senior teachers to choose their own schools. The analysis shows that just this one set of rules, all by itself, significantly effects the way quality teachers get distributed across a district's schools—and in so doing, magnifies the problems of disadvantaged schools by increasing the numbers of low-quality teachers they are burdened with. Rules that may seem on the surface to be totally benign, intended simply to give teachers more latitude in their choice of jobs, turn out to have major consequences for the way education's most valuable resource gets allocated across schools.

Transfer rules are just the tip of the iceberg. There are countless other rules that also structure the workplace of the public school, and—if structure matters—they too are likely to have real

[23] My focus here is on collective bargaining, a rather recent development in American government, but bureaucrats can also engage in bottom-up activities to influence structure and policy (e.g., through lobbying and internal bureaucratic politics) without benefit of collective bargaining. For work that sheds light on these aspects of bottom-up influence, see Carpenter (2001), Skowronek (1982), Rourke (1984), Krause (1999, and Lipsky (1983).

consequences for school performance. These consequences may not all be negative. Some may be positive. But whatever the situation may be, the full range of bottom-up structures needs to be taken into account if the public schools and their performance are to be well understood.

This same orientation needs to inform the study of government more generally. True, the public schools are more heavily unionized than most government agencies, and collective bargaining more central to their structure and performance. But the more relevant point is that bottom-up structure simply varies in its importance across public agencies, as well as across levels of government (local, state, federal) and across nations—and this is a variation that political scientists ought to be paying attention to.

In the United States, local and state agencies are likely to be heavily affected by bottom-up structure, because their employees—from prison guards and fire fighters to nurses, electricians, and general office workers—are often represented by powerful unions (such as AFSCME and the SEIU), and collective bargaining imposes major restrictions on how these agencies do their jobs (Kearney, 2000; Troy, 1994). Federal agencies appear to be less affected by collective bargaining, but the operative word here is "appears." Collective bargaining does occur at the federal level (consider the Postal Service), and it would be wrong to conclude that bottom-up structure is not an important influence on agency behavior. It simply has not been studied in much depth. Political scientists have not been interested, and there is barely any literature to even tell us what the facts are (see Johnson and Libecap, 1994, for a pioneering exception). It is clear, on the other hand, that unions and collective bargaining are quite important in national-level government agencies in other Western countries, and structures driven by employee power are almost surely a major factor in the way these agencies do their jobs (Blais, Blake, and Dion, 1997).

Public sector unions have been major political actors for some time now. They are newer in the United States than in Europe and Scandinavia (and many other places); but even in the U.S., thirty years hardly counts as new. This being so, it is time for our theories of politics to pay these unions some serious attention. This means recognizing that they are powerful actors in the policymaking process. But it also means recognizing that they participate in structuring the agencies that carry out public policy—and that the bottom-up structures they create may have important and unanticipated consequences for the performance of government.

Table 1: Descriptive Statistics for Sample of California Public Schools

Variable	Mean	Standard deviation
Prop. low quality teachers	.20	.12
School growth	.01	.09
School size	602.48	185.62
Number of teachers	31.61	10.30
Avg. class size	29.44	2.76
Minority composition	.49	.24
Transfer rights	1.05	.87

N schools = 1588
N districts = 115

All data are for California schools for the 1998-99 school year, except for school growth, which represents the change from 1997-98 to 1998-99.

Table 2: Base Model – Determinants of the Distribution of Low Quality Teachers across Schools

	Regression Model					Probit Model				
Variable	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**
School growth	.177***	(.030)	.03	.16	.27	.648***	(.098)	.03	.17	.28
Log school size	.039***	(.013)	.03	.13	.22	.128***	(.044)	.03	.12	.20
Class size	-.001	(.001)	-.01	-.04	-.07	-.005*	(.003)	-.01	-.04	-.06
Minority	.243***	(.036)	.12	.58	.96	.871***	(.118)	.12	.58	.96

N schools = 1588
N districts (clusters) = 115
Regression adj. R^2 = .47
Blocked probit log pseudo likelihood = -24,964.64

The dependent variable is the proportion of low quality teachers in the school. Statistical significance is indicated as follows: *** p<.01, ** p,.05, * p<.10. Analysis carried out in Stata using fixed effects (estimates not presented) with clustering on the school district. All tests are one-tailed, as they test the one-sided hypotheses discussed in the text. Standard errors are in parentheses. ΔP refers to the predicted change in the proportion of low quality teachers given a shift in the relevant independent variable from one standard deviation below its mean to one standard deviation above, holding all other variables constant at their means. ΔP/m refers to the predicted change in the proportion of low quality teachers divided by the mean value of the proportion of low quality teachers in the sample as a whole. ΔP/sd refers to the predicted change in proportion divided by the sample standard deviation of the proportion of low quality teachers. In the probit model, all impacts are calculated using the median of the estimated fixed effects as the constant term.

Table 3: Effects of Transfer Rules on the Distribution of Low Quality Teachers across Schools

	Regression Model					Probit Model				
Variable	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**
School growth	.149***	(.061)	.03	.14	.23	.530***	(.196)	.02	.11	.19
Log school size	.024	(.022)	.02	.08	.14	.094	(.102)	.02	.07	.12
Class size	-.001	(.002)	-.01	-.03	-.05	-.003	(.006)	-.00	-.02	-.03
Minority	.167***	(.030)	.08	.40	.66	.611***	(.102)	.07	.34	.55
Tran*Growth	.028	(.041)	.01	.05	.08	.109	(.129)	.02	.11	.19
Tran*Log sch size	.011	(.012)	.02	.08	.13	.023	(.052)	.02	.08	.14
Tran*Class size	-.000	(.001)	-.00	.02	.02	-.001	(.004)	-.01	-.03	-.05
Tran*Minority	.061**	(.033)	.06	.26	.47	.197**	(.106)	.09	.45	.73

N schools = 1588
N districts (clusters) = 115
Regression adj. R^2 = .48
Blocked probit log pseudo likelihood = -24,953.359

The dependent variable is the proportion of low quality teachers in the school. Each interaction term represents the relevant variable from the Basic Model (e.g., Minority) multiplied by the Transfer Rights variable (represented here by Tran). Statistical significance is indicated as follows: *** p<.01, ** p,.05, * p<.10. Analysis carried out in Stata using fixed effects (estimates not presented) with clustering on the school district. All tests are one-tailed, as they test the one-sided hypotheses discussed in the text. Standard errors are in parentheses. ΔP refers to the predicted change in the proportion of low quality teachers. ΔP/mean refers to the predicted change in the proportion of low quality teachers divided by the average value of the proportion of low quality teachers in the sample as a whole. ΔP/sd refers to the predicted change in proportion divided by the sample standard deviation of the proportion of low quality teachers. Impacts (the predicted changes in proportions) are calculated as follows. For the four Base Model variables, impacts represent the ΔP that we should expect in contexts without transfer rules; that is, they represent the ΔP associated with a shift in the relevant independent variable (percent Minority, say) from one standard deviation below its mean to one standard deviation above, assuming that transfer rules are at their least constraining (=0) and all other variables are held constant at their means. For the interaction terms, impacts for the relevant variable (e.g., percent Minority) are first calculated for contexts in which transfer rules are most constraining (=2) and other variables are at their means, and the difference between the two impacts—that is, the difference between the ΔP associated with strong-transfer-rule contexts and the ΔP associated with no-transfer-rule contexts—is the effect that transfer rules have in magnifying (or reducing) the impact of the variable in question. This is the ΔP that is entered into Table 3 for the interaction terms. In the probit model, all impacts are calculated using the median of the estimated fixed effects as the constant term.

Table 4: Effects of Transfer Rules in the Presence of District Controls

	Regression Model					Probit Model				
Variable	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**
School growth	.171***	(.031)	.03	.16	.26	.609***	(.097)	.03	.15	.11
Log school size	.035***	(.012)	.03	.12	.20	.097**	(.039)	.02	.09	.15
Class size	-.001	(.001)	-.01	-.03	-.06	-.005*	(.003)	-.01	-.04	-.07
Minority	-.934***	(.178)	--	--	--	-2.82***	(.463)	--	--	--
Min.*Transfer Rights	.056**	(.025)	.05	.27	.44	.149***	(.061)	.05	.23	.38
Min.*Log dist. size	.098***	(.027)	.07	.35	.59	.384***	(.066)	.09	.45	.75
Min.*Dist. bureauc.	.438	(.602)	.01	.05	.09	-.788	(1.62)	-.01	-.03	-.06
Min.*Dist. educ. level	-.546*	(.292)	-.06	-.29	.49	-1.89**	(.871)	-.07	-.33	-.55
Min.*Dist. educ. var.	.140	(.179)	.02	.11	.19	.310	(.522)	.02	.08	.14

N schools = 1560
N districts (clusters) = 113
Regression adj. R^2 = .49
Blocked probit log psuedo likelihood = -24,632.312

The dependent variable is the proportion of low quality teachers in the school. Each interaction term represents the relevant district-level variable multiplied by the minority variable (represented here by Min.). Statistical significance is indicated as follows: *** p<.01, ** p,.05, * p<.10. Analysis carried out in Stata using fixed effects (estimates not presented) with clustering on the school district. The tests on school growth, school size, class size, and min*transfer rights are one-tailed, as we are testing one-sided hypotheses discussed in the text. Tests on the other variables are two-tailed. Standard errors are in parentheses. ΔP refers to the predicted change in the proportion of low quality teachers. ΔP/mean refers to the predicted change in the proportion of low quality teachers divided by the average value of the proportion of low quality teachers in the sample as a whole. ΔP/sd refers to the predicted change in proportion divided by the sample standard deviation of the proportion of low quality teachers. Impacts (the predicted changes in proportions) are calculated as follows. For the first three Base Model variables, impacts represent the ΔP associated with a shift in the relevant independent variable (school growth, say) from one standard deviation below its mean to one standard deviation above, assuming that all other variables are held constant at their means. The impact of minority is not calculated, because it depends on the values taken on by all the district-level variables. For the interaction terms, impacts are calculated as follows. For min*dist. bureauc., for example, we begin by holding all district-level variables but dist. bureauc. at their means and all Base Model variables but minority at their means. We can then calculate the ΔP that results when minority shifts from one standard deviation below its mean to one standard deviation above, under the assumption that dist. bureauc. is "low" (one standard deviation below its mean). We can then calculate ΔP again, but under the assumption that dist. bureauc. is "high" (one standard deviation above its mean). The difference between the two ΔP's is the effect of dist. bureauc. in altering the impact of minority on the proportion of low quality teachers, and this difference is the ΔP that is entered into the table for the interaction term min.*dist. bureauc. The same procedure is followed in calculating impacts for all the other interaction terms, except for the one involving transfer rights. In that case, the relevant ΔP's represent the difference in impact between contexts in which transfer rights=0 (its "low" value) and contexts in which transfer rights=2 (its "high" value). In the probit model, all impacts are calculated using the median of the estimated fixed effects as the constant term.

Table 5: Effects of Transfer Rules on the Distribution of Low Quality Teachers across Districts

	Regression Model					Probit Model				
Variable	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**	**Coef.**	**(sd)**	**ΔP**	**ΔP/m**	**ΔP/sd**
Growth	.304***	(.094)	.03	.21	.33	.284	(.425)	.01	.05	.07
Log size	.025***	(.006)	.06	.38	.61	.059**	(.028)	.04	.22	.35
Log school size	-.012	(.019)	-.01	-.05	-.09	.072	(.120)	.01	.08	.12
Class size	-.000	(.002)	-.00	-.01	-.01	.023	(.019)	.03	.19	.30
Minority	.201***	(.024)	.11	.68	1.08	.786***	(.112)	.11	.64	1.02
Log teacher salary	-.133**	(.067)	-.02	-.14	-.23	-.225	(.308)	-.01	-.06	-.09
Work days	.002	(.003)	-.01	-.05	-.08	-.008	(.011)	-.01	-.04	-.07
Bureaucracy	.502***	(.144)	.04	.24	.38	3.15	(.915)	.06	.36	.57
Log spending	-.005	(.055)	-.00	-.01	-.01	-.283	(.313)	-.02	-.09	-.15
Urban	-.018	(.020)	-.02	-.10	-.17	-.067	(.078)	-.02	-.09	-.15
Suburban	.011	(.015)	.01	.06	.10	.072	(.073)	.02	.10	.16
Education	-.026	(.042)	-.01	-.05	-.07	.418	(.263)	.03	.18	.29
Elem. district	.021*	(.011)	.02	.13	.20	.003	(.058)	.00	.00	.01
Transfer rights	-.003	(.006)	-.01	-.04	-.06	.025	(.035)	.01	.07	.11
Constant	.905	(.988)				2.64	(3.97)			

N districts = 270

Regression adj. R^2 = .45

Blocked probit log pseudo likelihood = -35,235.695

The dependent variable is the proportion of low quality teachers in the district. Statistical significance is indicated as follows: *** p<.01, ** p,.05, * p<.10. Analysis carried out in Stata with clustering (blocked probit only) on the school district. All tests are two-tailed except for the test on transfer rights, as we are testing a one-sided hypothesis in that case. Standard errors are in parentheses. ΔP refers to the predicted change in the proportion of low quality teachers given a shift in the relevant independent variable from one standard deviation below its mean to one standard deviation above (or for dummies, from their low to their high value), holding all other variables constant at their means. ΔP/m refers to the predicted change in the proportion of low quality teachers, divided by the average value of the proportion of low quality teachers in the sample as a whole. ΔP/sd refers to the predicted change in proportion divided by the sample standard deviation of low quality teachers.

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