Teacher Attrition and Mobility in Urban Districts:

Evidence from Wisconsin

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Abstract: In the last few years, there has been increasing concern over the shortage of high-quality teachers around the country. However, such shortages have been suffered disproportionately by urban districts that tend to be larger, with more diverse student populations and higher concentrations of students with special needs. These districts face unique difficulties in attracting and retaining teachers. This chapter explores teacher attrition and mobility as one contributor to shortages in urban districts. Of particular interest is the impact of wage differentials – how *much* more is required to retain teachers in these high-need districts? Using data from Wisconsin, this chapter presents evidence that, because of the special characteristics of urban districts, common solutions to the teacher shortage problem for the education system as a whole may not be sufficient, or even appropriate, for urban districts. The results have important implications for school finance at the state level as policies that equalize salaries across districts may be contributing to the problem for central cities

In the last few years, there has been increasing concern about the shortage of high-quality teachers around the country. However, there are many who argue that the idea of a general teacher shortage is misleading, that the real problem is not one of quantity but of distribution. Emily Feistritzer and others point out that there are plenty of people available and qualified to teach but, for various reasons, these would-be teachers are not getting into the schools that need them (Feistritzer, 1998). The focus of policymakers therefore should not be on generating more teachers generally but on attracting teachers to the fields and districts that are in highest need.

The districts that do face true shortages tend to be urban and rural districts. In a recent survey of 40 of the largest urban schools, almost all expressed an immediate need for math, science, special education and bilingual teachers (Recruiting New Teachers, 2000). And even when similar percentages of urban and suburban schools report vacancies in math and science, central city schools are far more likely to state that it is "very difficult or impossible" to fill vacancies (National Center for Education Statistics, 1997). These shortages can have serious consequences for the quality of education for students in these districts, since when urban districts have vacancies, they are more likely to use substitute teachers, to hire a teacher that principals identify as "less than qualified", or to simply increase class size (NCES, 1997).

The reasons for shortages in urban districts are not a particular mystery and yet policymakers seem to have made little headway in combating the problem. This chapter will discuss the unique problems facing urban districts that lead to difficulties in hiring and retaining teachers, with a particular focus on the role of teacher attrition and mobility. Much of the attention on teacher shortages has focused on the difficulties attracting new teachers into the profession and retaining them once they are there. However, teachers are just as likely to leave

one teaching position for another as they are to leave for a job outside the teaching profession, and this within-profession mobility is a particular problem for urban districts. Because of this, common solutions to the teacher shortage problem for the education system as a whole may not be sufficient, or even appropriate, for urban districts.

The next section discusses why urban districts are more likely than other districts to experience teacher shortages. I then explore the more specific issue of teacher attrition. Using data from Wisconsin, I estimate district attrition rates for beginning teachers. Of particular interest is the impact of wage differentials – how *much* more is required to retain teachers in urban districts? The results have important implications for school finance at the state level as aid programs that seek to equalize spending across districts may be contributing to the teacher shortages in urban districts.

SUPPLY AND DEMAND IN URBAN DISTRICTS

According to Feistritzer (1999), the number of new teacher graduates (i.e., college grads qualified to teach) increased by 49% between 1983 and 1998. However, fewer than half of these graduates went into the classroom. In addition, there are thousands more in the general population who are qualified to teach – in 1993, over 20 percent of new *hires* in teaching were not new teachers but people who had taught sometime in the past and were returning to teaching (NCES, 1997). With all these potential teachers out there, why do we see headlines every year lamenting the shortage of teachers?

The reality is that there *are* shortages but they are suffered disproportionately in certain subject specialties and by urban and rural districts. A shortage, by definition, is a situation in which the quantity demanded exceeds the quantity supplied. Urban districts suffer from the

double misfortune of low supply and high demand, relative to other districts. In this section, I will discuss the many factors that contribute to teacher shortages in urban districts; in the next section, I focus on one specific cause of high demand in urban districts, teacher attrition.

Low Supply

In simplest terms, urban districts suffer from shortages because at a given wage, fewer teachers want to work in urban districts. It is not hard to understand why. All of the issues that teachers as a whole perceive as problems and hardships of teaching are bigger problems and hardships in urban schools. When asked about a host of problems, urban teachers were more likely than their suburban and rural counterparts to see problems as serious, including student absenteeism, verbal abuse of teachers, lack of parental involvement, student apathy, poverty, and student disrespect for teachers (NCES, 1997). In addition to these problems, urban teachers must also contend with physical limitations such as classrooms without heat or air conditioning, and a lack of books, supplies and computers, not to mention threats to their physical safety: 32% of urban teachers report that a student has threatened him or her, and 14.2% report actually being attacked[1].

Finally, the job of an urban teacher is often more challenging simply because the students have different needs. While similar percentages of urban and suburban teachers report having limited-English proficient (LEP) students in their classes, urban teachers are more likely to have *more* LEP students – suburban classrooms are most likely to have fewer than 10% of the class as LEP while urban classrooms are more likely to have more than 50%. 20% of urban teachers also report that student misbehavior interfered with their teaching and 37% feel that students being unprepared to learn is a serious problem.

With challenges such as these, it is little wonder that fewer people are interested in teaching in these districts. Because of these problems, economic theory suggests that urban districts need to offer higher salaries in order to attract the same quantity and quality of teachers as more attractive districts (Rosen, 1986). In general, if there are disamenities associated with a particular job, employers will need to offer a higher wage to attract workers; if there are positive amenities associated with a particular job, the wage will be bid down by the surplus of available workers. That is, market forces should lead to compensating wage differentials that reflect the amenities and disamenities associated with any particular job. However, in urban districts, salaries are often just as likely to be lower than neighboring suburban districts as higher. And even when they are higher, it is not clear that they are high enough to truly compensate teachers for the harsher working conditions. 63.4% of urban teachers report being unsatisfied with their salary, as opposed to 48.7% of suburban teachers. Added to this, urban teachers are also slightly less likely than their suburban counterparts to receive non-salary benefits; for example, 69.7% of urban teachers receive dental insurance, versus 76.6% of suburban teachers, and only 17% of urban teachers receive in-kind benefits (e.g., tuition reimbursement, childcare expense, etc.), compared to 26.4% of suburban teachers.

High Demand

While the supply of teachers to urban districts is lower than in other districts, the demand for urban teachers is higher. In part, this is simply a function of size – in virtually every state, the largest districts are urban and one in six students in this country attends a large city school. For example, districts with enrollments larger than 25,000 make up only 1.6% of all districts but educate 31.5% of all students (NCES, 1999). With so many students, urban districts simply have

more teacher positions to fill and these districts employ roughly one-third of the teacher labor force.

It is important to point out that because urban districts have more teacher positions overall, they need to hire more new teachers even when their hiring *rate* is the same as other districts. For example, if five percent of the teaching force in a district is newly hired, that may represent five new teachers in a district with one hundred teachers, or it could mean fifty teachers in a district with 1000 teachers.

The demand for teachers is also affected by policies to reduce class sizes. Although these policies are intended to improve the quality of education for students, they can create a large immediate increase in the demand for teachers that may compromise a district's ability to take full advantage of the smaller classes. Because of the size of urban districts, and given that these districts often start out with the largest class sizes, class-size reduction policies can generate a larger increase in teacher demand for urban districts. California's experience with class-size reduction suggests that while virtually all districts initially had concerns about filling new positions, urban districts hired a disproportionate share of inexperienced teachers with emergency credentials, and it is these districts that continue to have problems with teacher shortages (Stecher & Bohrnstedt, 2000).

Even in the absence of new positions that might be created by growing enrollments or class-size reduction, districts must replace those teachers that they lose, either through retirements, attrition to other jobs, or people who leave for various personal reasons. The fact that the cohort of baby-boom teachers is fast approaching retirement is a large concern for all districts though again, urban districts lose larger *numbers* of teachers even when the percentage of retirees is the same as other districts. In addition, while all districts are concerned with losing

teachers to other professions, urban districts are more likely to face the additional challenge of losing teachers to other districts. This within-profession mobility not only increases demand for teachers in urban districts, who must replace out-going teachers, but may also have implications for the distribution of teacher quality across districts. The next section explores this issue of teacher attrition in more detail.

TEACHER ATTRITION

According to the National Center for Education Statistics, the attrition rate out of teaching in 1993-94 was just under 7 percent. A slightly higher percentage moved between schools (NCES, 1998). The transfer attrition rate is even higher among new teachers. Many teachers begin their careers in urban districts (since these large districts are the most likely to be hiring), but then decide to leave teaching, or to move to more attractive suburban districts after gaining a few years of experience. In suburban and rural districts, over one-third of newly-hired teachers are experienced teachers, transferring from another teaching position, while only 15% of urban new hires are transfers (NCES, 1997). The catch-22 for urban districts is that when they have openings to fill, the teachers they hire are more likely to be new, inexperienced teachers, who are the most likely to leave within only a few years, only to be replaced by more new, inexperienced teachers who are again more likely to leave.

What can policymakers do to help stop the revolving door in urban districts? Unfortunately, we know relatively little about teacher transfer attrition. We know more about teacher attrition out of teaching or out of districts. There are several studies of the decision to stop being a teacher (see, for example, Dolton & van der Klaauw, 1999; Baugh & Stone, 1982; and Murnane & Olsen, 1990). These studies focus on the salary differential between teaching

and other professions or on teacher and district characteristics. The consensus from these analyses is that increasing teacher salaries relative to other professions is important for retaining teachers. Also, teachers who begin teaching later in life tend to stay in teaching longer, while teachers of math and science tend to have shorter teaching spells.

However, since these studies view attrition from the perspective of the profession, all teachers who remain in teaching (regardless of whether they remain in the same *job*) are compared to all teachers who leave teaching. This can give state or federal policymakers some important insights for retaining teachers overall but may be of limited help to districts who lose many of their teachers to other districts. Only a small number of studies have examined attrition from the perspective of the district (see Mont & Rees, 1996; Theobald, 1990). Similar to attrition out of the profession, these studies find that increasing teacher salaries can help with teacher retention.

But while these studies provide important information about which districts are most likely to lose teachers in general, these analyses compare all teachers who stay in a district with all teachers who leave a district. That is, teachers who leave teaching entirely are lumped together with teachers who stay in the profession but simply change jobs. Yet surveys of departing teachers suggest that there are important differences between these two groups; for example, teachers who leave the profession are more likely to be leaving for personal or family reasons (NCES, 1997). If teachers who transfer and teachers who exit teaching have different preferences, they may respond differently to policies designed to entice them to stay.

Theobald and Gritz (1996) is the only recent study to discuss transfer and exit attrition separately, and they find some important differences in how transfers and exits respond to salary changes and district spending decisions. In particular, raising salaries in all districts is found to

reduce the probability that a teacher will leave a district but given that she leaves, it increases the probability that she transfers to a different district (rather than exiting teaching altogether). However, when a district's salaries increase relative to other districts, the probability of transfer falls and the probability of exit increases. These differences imply that policies that increase teacher salaries need to be constructed carefully if the intention is to attract and retain teachers in high-need, urban districts.

TEACHER MOBILITY IN WISCONSIN

To further explore the impact of teacher salaries on teacher mobility and attrition, I use a slightly different econometric approach than Theobald and Gritz (1996) and focus on beginning teachers in the state of Wisconsin. Wisconsin's experience with teacher shortages during the late 1990's has been fairly representative of other states: shortages have been most acute in special education and in math and science subjects, while Milwaukee, which is the largest urban district, has been more prone than other districts to shortages in all subjects and specialties (Lauritzen, 1998). Using annual data on beginning teachers in Wisconsin, I estimate a competing-risks duration model in which the decision to transfer is separated from the decision to exit teaching.[2] The competing-risks duration model estimates the hazard function for teachers: the conditional probability that a teacher leaves her original district, given that she has not left prior to the year under investigation. Thus the model not only estimates whether a teacher is likely to leave but when she is most likely to do so. The results can then be converted to survivor functions which indicate the accumulated probability that a teacher will "survive" for a particular length of time. The competing-risk specification allows the decision to transfer to another district to be treated as a separate transition from an exit out of the teaching profession.

The data, described in Table 1, are provided primarily by the Wisconsin Department of Public Instruction and include anyone who became a teacher in a public school in Wisconsin between 1992-93 and 1998-99. The administrative data on teachers are rich in information about a teacher's basic characteristics and qualifications (race, age, education, experience) and job assignment (grade, subject, FTE). Added to this are data on student and districts characteristics, such as racial composition, total enrollment and the percent of poor students (proxied by the percent eligible for the federal free and reduced price lunch program). Missing from the data are marital status or family characteristics of the teachers. Because there are likely to be gender differences in the response to these unobserved variables (e.g., women are more likely to leave in order to take care of children), the estimation is done separately for men and women.

[Insert Table 1 about here]

Three measures of teacher wages are included in the analysis. A teacher's own salary is the most common measure. In addition, since district salary schedules clearly lay out salaries for all education and experience levels, a teacher has a great deal of information about what her future wages will look like. It is likely that she takes this information into account when deciding whether to stay or leave. Therefore, I include the maximum salary offered in the teacher's district as an indicator for a teacher's *expected* wages if she stays in the district. Also included is a measure of a teacher's *relative* wage within the teaching profession. While educators have complained for years about the differential between teacher salaries and wages in other professions, teachers who stay in teaching are likely to be more interested in what they could be making in other districts, not other professions. Therefore, I construct a relative wage variable that is the ratio of a teacher's own salary and the average salary earned by teachers with the same level of education and experience in nearby districts.[3] Finally, a cost of living index

(from the National Center for Education Statistics) and average earnings in the county are also included to control for regional salary differences.

The estimation results are presented in Table 2. The coefficients here are the hazard *ratios* – they represent the relative impact of a one-unit change in the variable on the probability of transfer or exit. For example, the coefficient of 1.99 on race in the exit hazard for women implies that a non-white female teacher is 1.99 times more likely to exit than a white female teacher. In general, a coefficient greater than one implies an increased probability of transfer or exit, while a coefficient less than one implies a decreased probability. Figure 1 shows the baseline estimated survivor functions for an average male and female teacher in an average district.[4] For both men and women, exit attrition rates are higher than transfer attrition but exit attrition also falls more quickly over time.

[Insert Table 2 about here]

[Insert Figure 1 about here]

The coefficients on district and student characteristics are not generally statistically significant but when taken together, they can reveal large differences in the transfer and exit attrition rates for various types of districts. Enrollment, percent poor students, percent minority students, unemployment, average earnings and cost of living are all higher in Milwaukee than in the base case. Rural districts have even higher unemployment but lower cost of living, and are the smallest districts, while suburban districts tend to the fewest poor students, the lowest unemployment rates and average earnings that are similar to Milwaukee. Figure 2 shows the estimated survivor functions for three representative districts (all compared to the base case from Figure 1) where the district and student characteristic variables take on the values of Milwaukee, an average rural district and an average suburban district. The characteristics of the teacher and

all salary variables are the same as in the base case. Note that while there is a 40% chance that a woman in a suburban district will leave teaching by her sixth year, and a 10% chance that she will transfer to a different district, these probabilities increase to 54% and 15% in Milwaukee.

[Insert Figure 2 about here]

Salary

Of primary policy interest is the impact of salaries on teacher retention. Will higher salaries lead to higher retention rates? Consistent with other studies of teacher mobility, the data from Wisconsin suggest that teachers *do* respond to wages. However, there are important differences in the response of teachers who are staying within the profession and those who are leaving it. There are also gender differences in the response to wages. The coefficients on current salary in Table 2 indicate that among women, increasing all teacher salaries reduces the probability of leaving teaching, but does little to stop mobility between districts. But female transfers do respond to increases in *relative* wages. That is, when salary increases are targeted so as to raise salaries in specific districts, relative to surrounding districts, women are less likely to switch districts. Interestingly, higher relative wages also *increases* the chance that a woman will exit teaching, though this effect is not statistically significant[5]. Among men, an across-the-board raise is associated with a reduction in both transfer and exit attrition and, as with women, increasing relative wages is correlated with higher exit attrition. How these offsetting effects will balance out for various districts will depend on whether they are more likely to lose teachers through transfers or exits, and the proportion of the teaching staff that is female vs. male.

Also of note is that the maximum district salary has a negative and statistically significant effect on female transfers and male exits. In fact, the hazard ratios associated with maximum salaries are even smaller for female transfers and male exits than the hazard ratios for current

salary, suggesting that increasing salaries at the top end of the salary schedule could have larger effects on retention of certain teachers than increasing a teacher's current salary (remember that a smaller hazard ratio means a lower probability of leaving). Thus, depending on the composition of the teaching force, it may be more effective, in terms of retaining new teachers, for a district to change the slope of the salary schedule than the level of beginning salaries.

While increasing salaries clearly can help slow attrition, the next question is how *much* do salaries need to increase? To answer this, the estimation results from Table 2 are used to simulate various wage-increase scenarios. Beginning with the survivor functions shown in Figure 2, various wages were increased by $5000 in each year; this is roughly one standard deviation of current beginning salaries, two-thirds of a standard deviation of maximum salaries. Many states have offered bonuses somewhat less than this to teachers who are willing to teach in high-need districts (see National Council on Teacher Quality, 2001); other states have offered bonuses significantly greater (e.g., Massachusetts made headlines a few years ago with $20,000 signing bonuses for new teachers, though there was no specific requirement that they teach in urban districts). The simulations here can help shed light on whether such policies are likely to be effective for retaining teachers.

[Insert Table 3 about here]

The simulation results for Milwaukee are presented in Table 3. It is important to point out that Milwaukee already offers higher wages than the average district, and generally higher wages than adjacent districts. On average, Milwaukee's beginning salaries, and relative wages, are roughly one half of a standard deviation higher than in the average district (ranging from $2400 more for second-year teachers to $3500 more for fifth-year teachers), and maximum salaries are one and a half standard deviations higher ($10,000). As shown in column A of Table

3, when the survivor functions from Figure 2 are re-calculated using Milwaukee's actual (higher) wages, women continue to exit at about the same rate but men are much slower to exit. Transfer rates are also slower; in fact, at actual current salary levels, male transfer rates out of Milwaukee are even lower than out of the average district. This highlights the fact that men are more responsive than women to changes in salary, and transfers are more responsive than exits to district-specific wage changes.

When $5000 is allocated on top of current salary levels, the effect varies largely by *how* the money is allocated. Among women, increasing maximum salaries has a very small effect on either exit or transfer attrition (columns D and E). Female exits are most responsive when beginning salaries are increased across the state (column B); as noted earlier, female exits increase when relative salary increases so when raises are targeted to Milwaukee, the increase in relative salary offsets the level effect (column C). But transfers *are* responsive to changes in relative salary. Thus, the impact on overall female attrition (from transfers and exits combined) is virtually the same whether salary increases are targeted or not.

Among men, increasing maximum salaries slows exit attrition *more* than increasing district-specific beginning salaries. This is due in large part to the result mentioned earlier that exits increase when relative beginning wages rise. In fact, when only beginning salaries in Milwaukee are increased (column C), men appear to exit more quickly than they do in the base Milwaukee simulation (i.e, without any wage change at all). When salaries for all beginning teachers in the state are increased, male exits slow to about the same rate as when maximum salaries are increased. Again, district-specific raises are more effective for transfers.

It should be noted that in all cases, for both men and women, $5000 is not enough to bring overall attrition in Milwaukee down to the levels of the average district. Transfer attrition

reaches comparable rates, but exit attrition rates are still higher in Milwaukee so that overall attrition remains higher.

CONCLUSION

The shortage of high-quality teachers is an issue that does not seem to be going away and for which a solution seems still to elude policymakers. A first step in solving the problem is recognizing that shortages are disproportionately experienced by certain types of districts. Urban districts, in particular, will continue to be threatened by teacher shortages as long as the conditions persist that contribute to lower teacher supply and higher teacher demand. In this chapter I have also tried to highlight the role that attrition and mobility may play in exacerbating shortages for urban districts. While much policy attention is directed at attracting more teachers into high-need areas, it is equally important to try to keep them there.

While many of the factors that contribute to shortages are outside the control of policymakers or local school officials (e.g., urban districts are likely to always be larger and serve students with different needs and problems than other districts), there is still much that policymakers can do. The one policy variable that undoubtedly receives the most attention in discussions of teacher shortages is teacher salaries. Will increasing teacher salaries help alleviate shortages? If so, how much more is needed? The focus in this chapter has been on teacher retention and the results from an analysis of Wisconsin teachers suggest that yes, increasing teacher salaries could help alleviate shortages by increasing retention of beginning teachers (and thus reducing demand for new teachers). This gives reason to be optimistic that current policies offering bonuses to teachers may pay off, particularly when those bonuses are tied to requirements that teachers remain in teaching for a specified length of time. Targeting new

money is also important – policies to increase teacher salaries across the state, that do not change relative district wages at all, may be less helpful for those districts that are in the most need. Thus, policies that offer bonuses specifically for teaching in urban districts are on the right track.

The evidence from Wisconsin also suggests that in addition to beginning salaries, new teachers consider future wages in their mobility decisions, particularly male teachers. Thus, it may be worthwhile for policymakers to consider increasing salaries all along the salary schedule, rather than targeting new teachers only. It is also interesting to point out that because in general, male teachers appear to be more responsive to salary than female teachers, policies that focus on salaries may help attract and retain men in a field that has traditionally been dominated by women.[6]

How much will it take? The answer will vary depending on how the money is allocated, but the simulations for Wisconsin suggest that to reduce attrition in urban districts to levels that are similar to other districts, it could require substantial amounts of new funding. Even with salary increases of $5000, or one standard deviation of beginning salary levels, the overall rate of attrition out of Milwaukee remains higher than out of an average district. And given the size of Milwaukee, even a comparable attrition *rate* would mean a higher *number* of teachers that must still be replaced.

The political reality is that the funding for teacher salary increases is limited. It is therefore important that policies be directed so as to maximize their value. Thus, policies that target high-need districts, and that tie bonuses to length of stay in teaching are appropriate. It is also important for researchers and policymakers to learn more about non-salary alternatives for attracting and retaining teachers, such as improving teaching conditions, developing mentoring and professional development programs, etc. Although the analysis presented in this chapter

supports the idea that salaries do matter, the results are stronger for men, who, on average, make up less than one-third of the teaching force overall. These gender differences may imply that it could be cheaper to focus policy efforts on alternative ways to retain teachers. More research is needed to determine whether non-monetary benefits and incentives may be more cost-effective for overall teacher retention than direct salary increases. Given that teacher shortages tend to contribute to lower educational quality for the students that are in the greatest need, it is imperative that we find practical ways to entice teachers into our urban centers, and keep them there.

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[1] Unless otherwise indicated, all statistics in this section are taken from the Schools and Staffing Survey 1993-94, as reported in NCES, 1997.

[2] See Imazeki, 2001, for a full description of the data, econometric model and estimation procedure.

[3] The geographic region used for comparison is the district's cooperative educational service agency (CESA). There are twelve CESAs in Wisconsin, each covering five or six counties and ranging from 18 to 75 districts.

[4] The simulated survivor functions are calculated using the coefficients from the hazard model estimation, with the values of the variables set to those of the base case teacher. The base case female teacher is assumed to be a white, elementary-school teacher with a bachelor's degree, teaching a non-math subject in a regular education program and who began teaching before age 30. She teaches in a suburban or town district with the values of all other variables set at the state means. The base case male teacher teaches high school but is otherwise the same as the base case female.

[5] This result is similar to that found by Theobald and Gritz (1996). It could perhaps be explained in the following way: a teacher has decided to leave a district where salaries are relatively high, and cannot find another teaching position that pays a comparable salary. She therefore chooses to leave teaching entirely. That is, higher relative salaries may not necessarily increase the probability that a teacher will leave, so much as the probability that she will exit given that she wants to leave anyway. The competing-risk model cannot clearly differentiate these decisions.

[6] On the other hand, given that men constitute a relatively small proportion of all teachers, concentrating on monetary incentives may have smaller marginal effects on overall retention goals than non-monetary incentives.

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Table 1: Summary Statistics

New Wisconsin Teachers, 1992-93 through 1998-99
Source: Wisconsin Department of Public Instruction

		Women		Men	
		MEAN	STD	MEAN	STD
		Total spells = 6967		Total spells = 2773	
Wages:					
Teacher Salary		$23,968.91	4894	$24,944.27	4302
Maximum Salary in district	$1992	$47,863.86	6988	$47,076.60	6953
Relative Wage	% of average salary in region	0.99	0.1	0.99	0.1
Teacher Characteristics:					
Race	1=non-white	0.05	0.21	0.05	0.21
Advanced Degree	1=Advanced degree beyond Bachelor's	0.06	0.24	0.07	0.25
Starting Age	1=Entered teaching after age 30	0.26	0.44	0.25	0.43
Math	1=teaches math or science course	0.09	0.29	0.24	0.43
Special Education	1=teaches special education	0.2	0.4	0.11	0.31
Elementary	1=teaches grade preK-6	0.51	0.5	0.2	0.4
High School	1=teaches grade 9-12	0.18	0.39	0.4	0.49
Part Time	1=teaches less than 100% time	0.11	0.32	0.08	0.27
Additional Duties	1=performs non-teaching duties for pay	0.14	0.35	0.37	0.48
Student Characteristics:					
Poor	% students eligible for Free and Reduced Price Lunch program	27.7%	22	26.4%	20
Nonwhite	% students non-white	17.8%	25	15.0%	23
Enrollment		17827.97	33313	14535.93	30262
District Characteristics:					
Milwaukee		0.16	0.37	0.13	0.34
Rural		0.26	0.44	0.31	0.46
Cost of Living Index		100	4.18	100	4.03
Unemployment Rate		4%	1	4.1%	1
Average county earnings	$1992	$21,980.48	3295	$21,980.48	3295
Total Spending per Pupil	$1992	$5,629.50	709	$5,600.70	694
Instructional Spending/Total Spending	$1992	0.63	0.025	0.63	0.026

Table 2: Competing-Risk Hazard Model Estimates

	Transfers		Exits	
	Women	Men	Women	Men
Wages:				
Teacher Salary (log)	0.848	0.319**	0.458**	0.443**
	(0.64)	(4.5)	(9.14)	(5.22)
Maximum salary in district	0.334**	0.629	0.722	0.233**
	(2.17)	(0.73)	(1.21)	(2.7)
% of average salary in region	0.257**	0.672	1.439	2.403**
	(2.75)	(0.72)	(1.53)	(2.35)
Avg County Earnings (log)	1.348	0.99	0.771	1.322
	(0.69)	(0.02)	(1.08)	(0.62)
District Characteristics:				
Milwaukee	2.361**	1.823	1.206	1.892
	(2.30)	(1.14)	(0.99)	(1.57)
Rural	1.117	0.742**	1.033	1.164
	(1.0)	(2.1)	(0.51)	(1.28)
Cost of Living Index	0.074	0.019*	1.881	0.187
	(1.46)	(1.71)	(0.84)	(1.03)
Unemployment Rate	6.981	0.72	3.968	2.697
	(0.5)	(0.07)	(0.68)	(0.27)
Total spending (log)	1.03	0.187**	2.56**	0.946
	(0.08)	(3.05)	(4.11)	(0.13)
Instructional Spending/Total Spending	0.366	0.144	0.067**	0.031*
	(0.58)	(0.86)	(2.86)	(1.95)
Student Characteristics:				
% poor students	0.597	0.766	0.863	0.254**
	(0.89)	(0.33)	(0.42)	(2.56)
% nonwhite students	1.839	3.726*	0.951	4.391**
	(1.14)	(1.69)	(0.15)	(2.88)
Nonwhite teacher x nonwhite students	0.354	0.138	0.241**	0.294**
	(0.55)	(1.32)	(4.24)	(2.43)
District enrollment (log)	0.828**	0.757**	1.11**	0.986
	(2.87)	(3.07)	(2.77)	(0.19)
Teacher Characteristics:				
Race (1=Non-white)	0.259	1.026	1.99**	2.949**
	(1.15)	(0.04)	(3.49)	(3.8)
Entry Age (1=enter after age 30)	0.518**	0.737**	0.685**	1.297**
	(5.49)	(2.18)	(7.11)	(2.7)
Advanced Degree	0.751	1.097	1.335**	1.149
	(1.38)	(0.44)	(3.64)	(0.98)
Math (1=teaches math or science)	1.44**	1.255*	1.021	0.748**
	(2.82)	(1.78)	(0.28)	(2.57)
Special Ed	1.829**	1.413*	1.132**	0.955
	(6.14)	(1.94)	(2.34)	(0.33)
Elementary	0.783**	0.679**	0.858**	0.724**
	(2.40)	(2.17)	(3.0)	(2.64)
High School	1.295**	1.057	0.979	1.119
	(2.33)	(0.47)	(0.36)	(1.22)
Part time	1.012	0.558**	1.008	1.274
	(0.06)	(2.25)	(0.1)	(1.57)
Additional duties	1.15	1.164	1.079	0.748**
	(1.18)	(1.26)	(1.16)	(2.93)
Observations	17200	6983	17200	6983

Absolute value of robust z-statistics in parentheses
* significant at 10%; ** significant at 5%

Figure 1: Baseline Survivor Rates

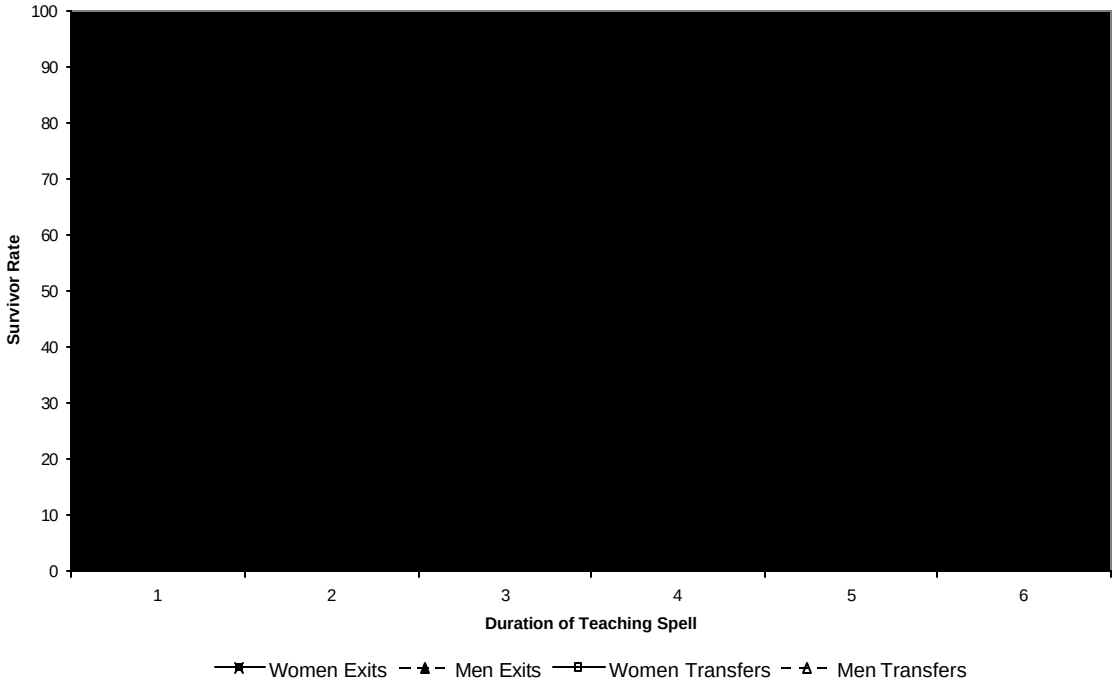

Figure 2: Simulated Survivor Functions For Milwaukee, Rural, Suburban

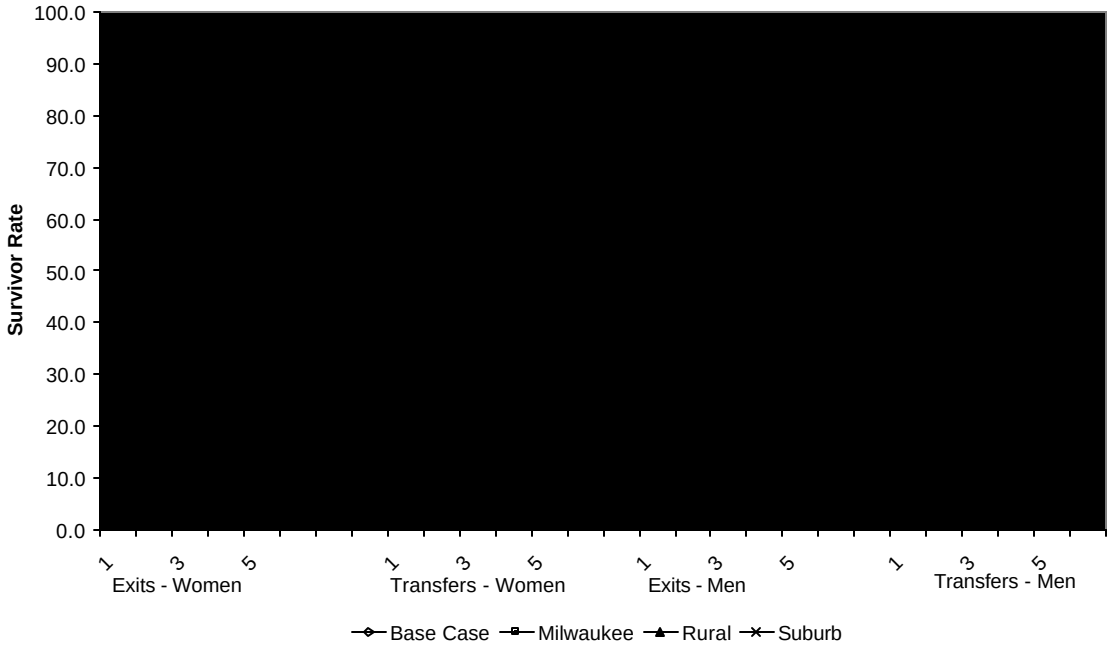

Table 3: Survivor Functions for Milwaukee: Simulations with $5000 added to salaries

		A		B		C		D		E	
	Duration of teaching spell	Actual Salary		$5000 for All Beginning Teachers		$5000 for Beginning Teachers in Milwaukee		$5000 for All Experienced Teachers		$5000 for All Teachers in Milwaukee	
		Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
Exits	1	81.1	83.6	83.7	85.9	82.4	83.2	81.6	85.5	82.9	85.1
	3	59.4	66.8	63.9	70.7	61.6	65.8	60.4	70.1	62.5	69.3
	5	50.1	56.6	54.9	61.2	52.3	55.4	51.1	60.6	53.3	59.4
Transfers											
	1	97.2	94.9	97.3	95.9	97.9	96.2	97.4	95.1	98.1	96.3
	3	93.1	88.1	93.3	90.2	94.9	90.9	93.7	88.6	95.3	91.3
	5	89.5	84.3	89.8	86.9	92.1	87.9	90.4	84.8	92.8	88.3