The Role of Place: Labor Market Dynamics in Rural and Non-rural School Districts

WCER Working Paper No. 2017-4

September 2017

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Suggested citation: Goff, P. T., & Bruecker, E. M. (2017). *The role of place: Labor market dynamics in rural and non-rural school districts* (WCER Working Paper No. 2017-X). Retrieved from University of Wisconsin–Madison, Wisconsin Center for Education Research website:
http://www.wcer.wisc.edu/publications/working-papers

Abstract

A considerable body of work has addressed teacher labor markets and the sorting of teachers within and among school districts. Many studies have focused on urban schools within teacher labor markets, but far less research has examined teacher supply and demand among rural school districts. This study examines the pool of applicants vying for teaching vacancies in 311 Wisconsin districts to determine how applicants differ across geographic categories, particularly with regard to education, experience, and geographic preferences. We find no evidence to support claims of a rural teacher shortage; however, applicants do appear to be averse to rural contexts. Some factors, such as enrollment in particular universities and rural student teaching experiences, increase applicants' interest in rural vacancies. Similarly, districts' proximity to educator preparation programs increases applicant pools for all locales, yet rural districts tend to be further from universities and have fewer programs within a 40-mile radius.

Keywords: rural schools, labor markets, teacher supply, shortage

The Role of Place:
Labor Market Dynamics in Rural and Non-rural School Districts

Peter T. Goff and Ellie M. Bruecker

A considerable body of work has addressed teacher labor markets and the sorting of teachers among school districts. This research has demonstrated that teacher labor markets tend to be quite small; novice teachers, for example, typically accept positions within 15 miles of their hometowns or undergraduate universities (Boyd, Lankford, Loeb, & Wyckoff, 2005; Engel & Cannata, 2015; Reininger, 2012). Teachers, even more so than other professionals, are likely to work close to their hometowns or in areas geographically similar to where they grew up (Boyd et al., 2005). Much of this research on teacher sorting has focused on urban schools, highlighting the negative impacts of teachers' desire to work near their homes for large-city school districts (Boyd et al., 2005; Bacolod, 2007; Engel, Jacob, & Curran, 2014). Far less research has examined teacher supply and demand among rural school districts; however, some studies have found that rural school districts employ higher percentages of first-year teachers than non-rural school districts and that teachers in rural schools are more likely to transfer to non-rural schools (Miller, 2012; Cowen, Butler, Fowles, Streams, & Toma, 2012). Thus, the labor market challenges that have been detailed through research in urban contexts are apt to be equally severe—if not more so—in the 7,156 rural districts across the nation.

Recent legislation in Wisconsin has loosened certification requirements for some teaching positions, and sponsors of the legislation had hoped to ease them even more, based in part on claims that rural districts in the state were suffering from teacher shortages (Beck, 2015, June 11). The policies proposed and passed in Wisconsin imply that a labor supply problem exists for rural school districts in the state. In making certification requirements less restrictive, the proposals suggest that legislators believe rural schools can attract potential teachers, but that current requirements negatively impact the applicant pool. However, this legislation was made in the absence of empirical support to substantiate the severity or existence of a rural teacher shortage. It is possible that the labor markets of rural schools are not notably different than those of other locales. Even if a shortage of qualified rural educators were well documented, it is unclear whether demand exists for *uncertified* teachers. In the case of Wisconsin, a policy solution has been offered before the policy problem has been carefully diagnosed. This study aims to determine the nature of the teacher labor market in Wisconsin so as to better inform policy-making and provide an exemplar for subsequent studies of labor demand.

The majority of previous research on teacher labor markets has relied on administrative data, using changes in teacher position to better understand teacher mobility and attrition. Administrative data may explain trends in hiring or identify the characteristics of successful applicants, but we learn little about the choices teachers make in applying for new positions when the data omit the application process. Such data are poorly suited for exploring teachers' workplace preferences, documenting how supply may differ across locales, and providing

evidence of a supply shortage. To continue building our understanding of labor market trends, this study examines the applicants for various job openings in a (nearly) statewide sample.

Understanding the complex sorting phenomena at work in the labor market requires an examination at two levels, that of the applicant and that of the district. Using the applicant as our focal point allows us to examine trends of individuals and address questions such as, "When rural teachers enter the labor market, how likely are they to seek out positions in other rural schools?" Using the district as our focal point allows us to answer questions such as, "Do vacancies in rural districts attract fewer applicants than similar vacancies in other locales?" To facilitate comparisons among individuals, we identified three groups of applicants: exclusively rural, exclusively non-rural, and geographically flexible. When comparing among districts, we have relied on a classification consisting of urban, suburban, town, and rural locales. Our overarching research question is: How do rural and non-rural teacher labor markets differ? We pursue this question through an examination of teacher trends (RQ1) and district trends (RQ2).

RQ1: What are the characteristics of teachers who apply to rural districts?

RQ2: How does the size of the applicant pools in rural districts compare to that of non-rural districts?

Through an analysis of teacher application trends among school districts, we provide timely and novel evidence to inform persistent teacher staffing challenges.

Defining Rural Schools

Studying rural schools is complicated by the difficulty of defining what is rural. Too often, "rural" is defined only as "not urban." This urban-centric proclivity is evident in the criteria used by the U.S. Census where population thresholds are used to identify urban cities, clusters, and areas, and all that does not fit into "urban" is labeled "rural" (Urban Area Criteria for the 2010 Census, 2011). Thus, rural areas are not distinguished by rural characteristics, but rather by their lack of defining urban qualities. This dichotomy of "urban" and "other" is problematic for many disciplines. Regional planning literature has addressed this gap, arguing that rural places could indeed be classified by "natural features and economic use" (Miller, 2013). However, there are few frameworks within the educational research community for assessing or mapping rurality like the one defined by Miller, and the literature certainly lacks consensus on the defining characteristics of rural.

In addition to the dominant definition of rural as "not urban," prior research has highlighted the diversity among schools and communities labeled "rural." Based on the Census definitions, the National Center for Education Statistics (NCES) Common Core of Data (CCD) has further categorized local education agencies (LEAs) as Rural, Fringe; Rural, Distant; and Rural, Remote. Research by Greenough and Nelson (2015) demonstrates the variation among the students, schools, and school districts in these three rural categories. More than three-fifths of the students in rural schools fall under the Rural, Fringe category, meaning that the majority of students in

rural districts are within 2.5 miles of a larger town or within five miles of an urban city (Greenough & Nelson, 2015). Greenough and Nelson (2015) also find that these categories of rural schools differ significantly in terms of remoteness, size of enrollment, race and ethnicity, poverty rates, and enrollment growth or decline. Kozoil et al. (2015) make similar considerations for the variation within the umbrella of rural schools, outlining the importance of the process of operationalizing what is rural in quantitative research. To be sure, an agreed-upon definition of what is rural does not exist, and it appears that to define it would be challenging because of the varying nature of rural schools and students.

Where to Apply? A Choice-based Framework

Job-choice theory examines teachers' preferences through objective, subjective, and critical contact perspectives (Pounder & Merrill, 2011). Prospective teachers determine their preferences based on objective measures such as expected salary, benefits, and cost of living associated with employment in a given city. Teachers also use subjective measures to predict their ability to meet personal goals and have desired working conditions within a given organization, as well as to assess their fit with its values. When certain information is not available, teachers employ critical contact theory, judging the organization by existing interactions with recruiters, interviewers, or other school employees (Evans, 2011).

These theories are useful in a study regarding teacher mobility based on the geographic location of the school district. The school selection process is neither random nor haphazard. It is a process in which applicants think carefully about the organizations in which they will work. Teachers weigh multiple factors that could influence their decisions to apply to particular institutions. Applicants will sort through job opportunities with an objective lens, considering cost of living in a particular geographic area or the variance in average salary from one school district to the next. Subjective measures like the applicant's interpretation of the safety, wealth, and community demographics can steer an applicant toward or deter an applicant away from particular vacancies. Finally, for first-time teachers or uncertified teachers especially, lack of information and experience can lead applicants to determine their fit with a school district based on critical contact interactions with other teachers from the school or with their interviewer.

Krieg, Theobald, and Goldhaber (2015) find that student teaching placements are highly predictive of teachers' first-year job placements. More than half of the sample of student teachers in the Krieg et al. (2015) study took their first jobs in districts within 25 miles of their student teaching placement. The paper also finds a strong relationship between initial teaching positions and teachers' hometowns, though this is not as predictive as student teaching placement (Krieg et al., 2015). Likewise, prior literature has long established the localism of teacher labor markets and the strong relationship between teachers' hometowns and the school districts in which they choose to work (Boyd et al., 2005; Engel & Cannata, 2015). The Krieg et al. (2015) study's addition to the literature appears to suggest that the networks and geographies that teachers rely on in their job search may change over time.

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Previous research has shown that school districts serving high populations of low-income students also have higher concentrations of inexperienced teachers (Bacolod, 2007; Lankford, Loeb, & Wyckoff, 2002). Maier & Youngs (2009) also find that alternatively certified or uncertified teachers are disproportionately found in schools with the most economically disadvantaged students. Experienced teachers are more likely to leave low-performing, low-income school districts, forcing these districts to hire less-qualified and inexperienced teachers (Cowen et al., 2012). These patterns persist across geographical categories; studies have found that both urban and rural schools are more likely to be staffed by inexperienced educators (Boyd et al., 2005; Miller, 2012). Teacher salaries also vary widely across locales. Urban and suburban school districts offer the highest salary to prospective teachers, although these areas generally have higher costs of living as well (Chambers & Fowler, 1995). Rural and remote school districts offer salaries 8–9% below the average teacher salary, and well below what is offered in city center districts and suburban schools (Chambers & Fowler, 1995). These school district characteristics inform teachers' choices as they sort themselves within the labor market and determine where to seek employment.

Sample

The application data used for this research come from the Wisconsin Education Career Access Network (WECAN), a job application website used by the majority of Wisconsin's 424 school districts. Applicant information submitted for all teacher vacancies to public school districts between January and October 2014 were used for this study. The WECAN dataset includes extensive information about each applicant, such as home address, school address, certification status, licenses held, previous school district employers and addresses, student teaching, and education (GPA, institution, major). The dataset comprises 5,208 vacancies, 14,300 applicants, and 194,495 applications. The districts in our analytic sample represent 83% of Wisconsin's teaching positions, and 67% of the state's non-charter LEAs. Of our sample districts, 52% are classified as rural, closely mirroring the larger Wisconsin context of 58% rural. Another 24% of the districts in our sample are towns, while 19.2% are suburbs, and 4.5% are cities. The geographic locales of the districts that are not represented in this sample are similarly distributed (21%, 15%, and 7%, respectively). This sample represents the largest and most comprehensive education labor market database compiled to date.

Measures

The geographic locale codes created by the NCES classify LEAs as cities, suburbs, towns, or rural areas. The LEAs consist primarily (91%) of public school districts, but also include regional support centers and independent charter schools. The NCES locale codes are based on location inside or outside of a principal city, an urbanized area, or an urban cluster. LEAs are further categorized within these four locales based on population size and distance from urban-centric areas. These codes and their parameters are listed in Table 1.

***Table 1*. Locale Parameters and Sample Distribution**

	Locale Code	N WI Teachers	N WI LEAs (%)	N Sample (%)	Parameters
City	*Large*	6,273 (8.3%)	16 (3.5%)	1 (0.3%)	Inside an urbanized area and a principal city Population ≥ 250,000
	Midsize	4,728 (6.2%)	3 (0.7%)	1 (0.3%)	Inside an urbanized area and a principal city Population ≥ 100,000 and < 250,000
	Small	11,060 (14.6%)	15 (3.2%)	12 (3.8%)	Inside an urbanized area and a principal city Population < 100,000
Suburb	*Large*	10,423 (13.7%)	41 (8.9%)	39 (12.3%)	Outside a principal city and inside an urban cluster Population ≥ 250,000
	Midsize	3,955 (5.2%)	14 (3.0%)	8 (2.5%)	Outside a principal city and inside an urban cluster Population ≥ 100,000 and < 250,000
	Small	3,156 (4.2%)	15 (3.2%)	13 (4.1%)	Outside a principal city and inside an urban cluster Population < 100,000
Town	*Fringe*	5,106 (6.7%)	31 (6.7%)	23 (7.3%)	Inside an urban cluster 10 ≥ miles from an urbanized area
	Distant	8,774 (11.6%)	49 (10.6%)	40 (12.6%)	Inside an urban cluster > 10 & ≤ 35 miles from an urbanized area
	Remote	2,303 (3.0%)	16 (3.5%)	13 (4.1%)	Inside an urban cluster > 35 miles from an urbanized area
Rural	*Fringe*	4,505 (5.9%)	50 (10.8%)	32 (10.3%)	≤ 5 miles from an urbanized area ≤ 2.5 miles from an urban cluster
	Distant	8,706 (11.5%)	110 (23.8%)	76 (24.0%)	> 5 miles from an urbanized area > 2.5 & ≤ 10 miles from an urban cluster
	Remote	6,866 (9.1%)	103 (22.3%)	54 (17.0%)	> 25 miles from an urbanized area > 10 miles from an urban cluster

Although scholars such as Greenough & Nelson (2015) have pointed out the challenges associated with creating clear delineations among locale types, the CCD-coded rural LEAs in Wisconsin tend to align well with specific indicators of rurality, buttressing the validity of this measure for our purposes. For example, 54% of Wisconsin's rural districts received Sparsity Aid from the state, a form of supplemental funding granted to districts with small district membership and low population density. The state also allocates additional funding to support transportation costs for districts with large geographic areas. Of the districts receiving above the average allocation of Transportation Aid or more, 86% are classified as rural by the CCD. Rural districts in Wisconsin are also most likely to be experiencing consistent decline in enrollment: 82% of the districts in the 90th percentile for enrollment decline in the last 3 years are classified as rural, and nearly two-thirds of districts that have seen consistent, year-to-year enrollment reductions since 2010 are rural.

In addressing our second research question we include controls for the scarcity of the labor supply. In constructing these controls, we sorted vacancies by type of teacher sought and then ranked these vacancies by the size of the applicant pool. We then divided this ordered list into thirds. The teaching assignments in each of the three supply categories align well with national trends and anecdotal reports from around Wisconsin. For example, high-supply vacancies were

characterized by districts seeking elementary, early childhood, physical education, and social studies teachers; our mid-supply group consisted of postings for math, English-language arts, science, music/theatre/art, & special education vacancies; and low-supply vacancies sought bilingual, family and consumer science, agriculture education, and technology education teachers. These high, medium, and low-supply vacancies solicited an average of 65, 20, and 8 applications per vacancy, respectively.

Analysis

A primary challenge to studies of educational labor markets is the unknown composition of the labor supply pool. For example, using administrative data records we can infer that every individual who changed jobs (in particular, between districts) was active in the labor pool. However, these individuals did not apply to all vacancies and thus were not equally interested in all positions. Likewise, when hiring a particular teacher, a given school was not selecting from all teachers in the labor market, but rather only from the pool of candidates that applied for the position in question. Therefore, in many studies of labor market dynamics the counterfactual (who might have been hired) is missing or held to unreasonable assumptions. The methodology we apply to this study addresses this limitation by using combination of descriptive statistics and regression modeling (OLS and poisson). For RQ1, the proportion of applications a candidate submitted to vacancies in rural districts represents our dependent variable and a combination of applicant characteristics (e.g., prior teaching experience, selectivity of undergraduate institution, highest level of education, certification) constitutes our independent variables.

To address our first research question, we integrated measures such as whether or not the applicant completed her/his student teaching experience in a rural context, the locale in which the applicant previously worked, the area in which she/he previously taught, and demographic data. Although these are measures with direct policy implications, for many applicants these values are missing. Novice teachers, for example, are not in the Wisconsin Department of Public Instruction database and thus we have no race or gender data for them. This is also true of teachers applying from out of state or out of sector, for whom we are additionally missing data on student teaching locale and prior teaching locale. To accommodate these missing values we used two approaches. First, we created dummy variables for categories that are logically inconsistent, such as what or where a novice teacher taught previously. However, even after this step, complete-case analysis would force us to lose 60% of our applicant sample, largely because of rural student teaching (30%), demographics (20%), or a combination of the two. Our second strategy was to present comparisons among the various samples to better understand the relationship among these factors, missing data, and teachers' propensity to seek out employment in rural schools. The OLS model used for our teacher-level inquiry is shown below.

$$\%\ Rural\ Apps = \beta_0 + \beta_1(student\ teaching) + \beta_n(demographics) + \beta_n(prior\ work) + e$$

Our second research question approaches rural labor markets from an organizational perspective and examines the ways in which district characteristics relate to the number of applicants in a given vacancy. In this model, we use the number of applications in each vacancy

as the dependent variable and examine the how applicant pools differ across geographic contexts while controlling for factors such as demand level of the vacancy, median local salary, district characteristics, and proximity to an educator preparation program (EPP). The poisson model below indexes observations by vacancy (*v*) and district (*d*). Standard errors are cluster-adjusted by district.

$$\#\ Apps = \beta_0 + \beta_l(Locale)_d + \beta_n(Supply)_{vd} + \beta_n(District\ context)_d + e_{vd}$$

Findings

In our descriptive analyses we identify three types of applicants in the labor market: exclusively rural, exclusively non-rural, and geographically flexible. Geographically flexible applicants, those who apply to positions in multiple geographic locales, are of particular policy interest as they represent a population of teachers who might be receptive to initiatives to work in rural schools.

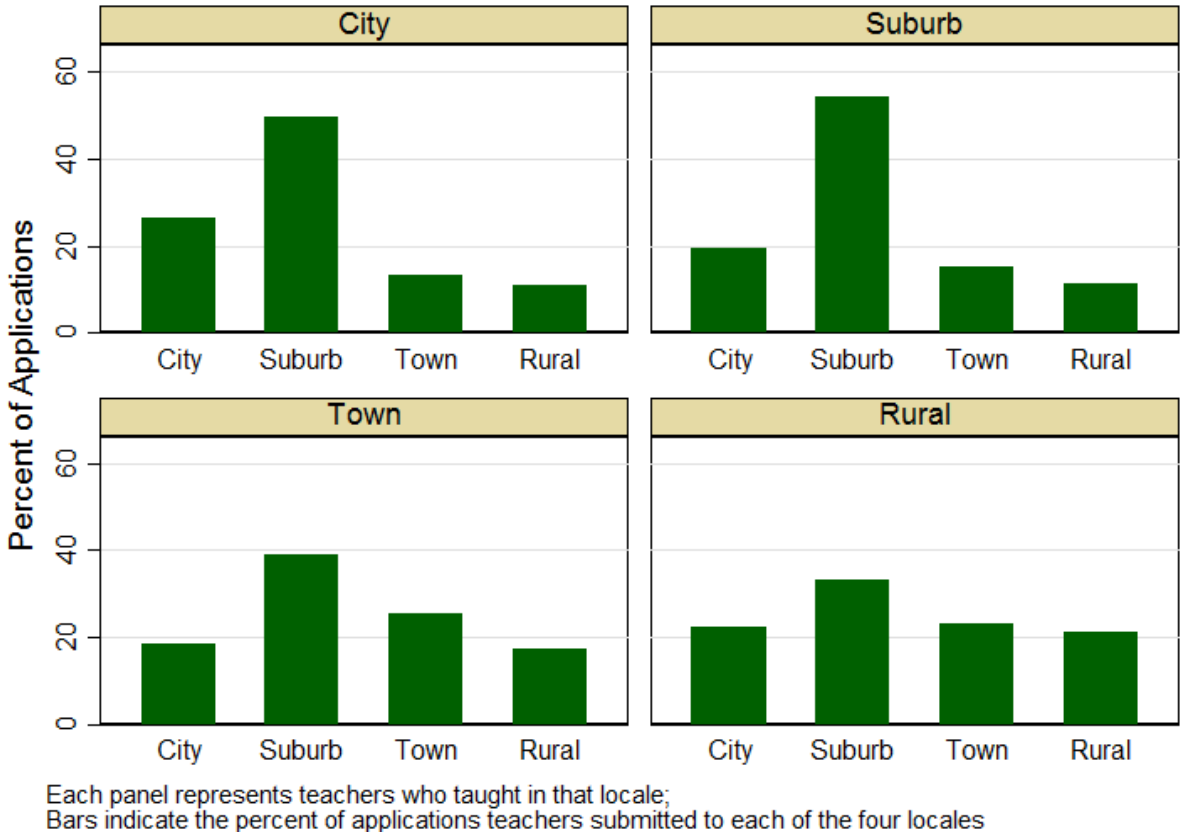
We find that the majority of the applicants in our sample appear to prefer non-rural teaching positions. Nearly 90% of the sample submitted less than half of their applications to rural schools, with more than 54% of candidates applying to no rural districts at all. About 5% of applicants submitted the majority of their applications to rural school districts, and the final 5% of our sample applied exclusively to rural districts. Although currently employed teachers on the job market come from an approximately even distribution of the four locales, teachers from rural districts comprise almost half of the exclusively rural applicants. Thus, it appears that rural teachers seek out teaching opportunities in rural contexts, while non-rural teachers tend to avoid them.

***Table 2*. Variation in Teacher Characteristics by Proportion of Rural District Applications**

	Proportion of Applications to Rural Districts			
	0%	1.00–49.99%	50.00–99.99%	100%
Average years of experience	6.94	4.10	5.52	7.53
Average GPA	3.62	3.57	3.58	3.65
Average Barron's ranking	4.00	3.99	4.11	4.13
% certified	92.24	94.34	92.58	91.21
% graduate degree	42.20	23.75	34.30	41.94

We find some evidence of important differences among teachers submitting 0%, 1–49%, 50–99%, and 100% of their applications to rural vacancies. Table 2 shows that teachers in these groups differed significantly in their teaching experience and education level, but did not vary in terms of certification rates, college GPA, and selectivity of undergraduate institution. We also examined the types of locales sought by applicants based on their current teaching locale. Our results, shown in Figure 1, reveal that applicants submit the highest proportion of their applications to suburban districts, regardless of the locale in which they are currently employed. For cities and towns, the second highest locale preference aligns with the locale in which the applicant is currently teaching. Rural vacancies occupy the smallest proportion of teachers' applications across all contexts.

Figure 1. **Distribution of Teachers' Applications across Locales by Current Teaching Locale**



Each panel represents teachers who taught in that locale;
Bars indicate the percent of applications teachers submitted to each of the four locales

However, rural districts benefit from having the fewest teachers actively searching on the market; 6.8% of rural teachers are actively searching, as compared to 8.6% of urban teachers, 9.1% of suburban teachers, and 7.8% of teachers in towns (see Table 3). This contrast between applicants' aversion to rural locales and the lower search rates among rural teachers underscores the complexity of the teacher labor market.

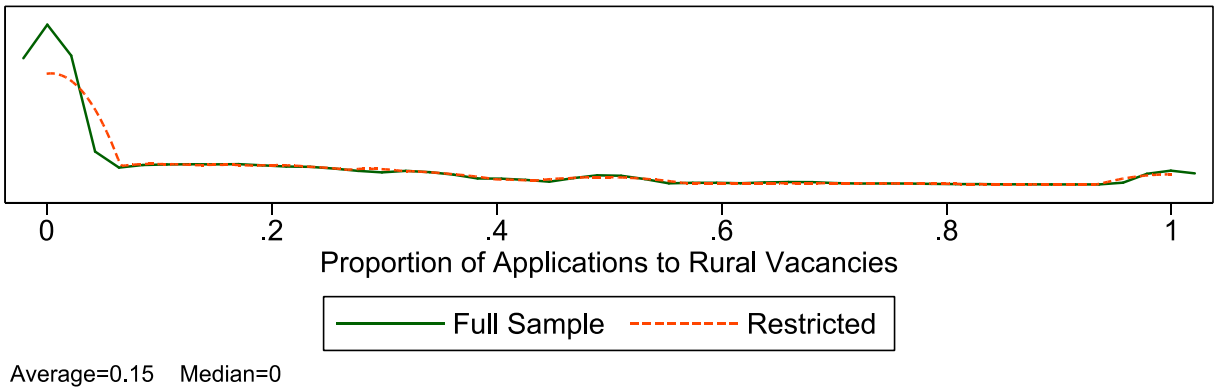
Table 3. **Supply and Demand Characteristics across Locales**

	Urban	Suburban	Town	Rural
Vacancies	1,300	1,702	1,277	1,071
Applications	42,085	77,072	33.591	29,587
Applications per vacancy	32	45	26	28
Teachers employed	22,061	17,534	16,183	20,077
Teachers within the locale searching	1,891	1,595	1,239	1,357
% of teachers within the local searching	8.6%	9.1%	7.8%	6.8%
Vacancies per 100 teachers	6	10	8	5

In Table 4 we present findings from our first research question: What are the characteristics of teachers who apply to rural districts? Here we use a variety of personal and professional characteristics to identify factors most strongly related to teachers seeking employment in rural contexts. Models 1–3 draw from the sample of 3,241 applicants with complete information on all measures, whereas models 4–6 more closely mirror the larger sample and the statewide population (*N*=6,352). When interpreting results from models 1–3 we may be concerned that what we learn about the relationship between teachers' preferences for rural locales and factors such as student teaching and teacher demographics may stem from differences in the sample rather than substantive differences among various factors. By comparing among our models, we mitigate some of these concerns. Model 1 contains all variables; race and gender have been removed from models 2 and 4; and models 3 and 6 have student teaching, race, and gender omitted. By comparing model 1 and model 2, we see that the removal of demographic characteristics does not induce any substantive changes on the other estimates in the model, including whether or not the teacher did her/his student teaching in a rural locale.

Figure 2 adds further credence to the similarity between the full and restricted samples, showing that the distribution of the independent variable—the proportion of applications submitted to vacancies in rural districts—is quite similar for both samples. Both samples also have a mean of 0.15 and a median of 0. Perhaps most importantly, comparisons between models 1 and 4 show similar trends, as do comparisons between models 3 and 6. In total, this suggests that the effect of having a rural student teaching experience, which appears to increase applications sent to rural schools by 15% to 20%, may hold across the statewide population of teachers.

Figure 2. **Distributional Trends for the Proportion of Applications to Rural Vacancies for the Full and Restricted Samples of Table 4**



Three other notable findings emerge from the analysis presented in Table 2. First, of the measures that may serve as proxies for teacher quality (undergraduate GPA, teaching experience, and selectivity of undergraduate institution), only undergraduate selectivity appears to be related to rural application patterns (increasing them by 1–2 percentage points). Second, teachers working in non-rural locales apply to far fewer rural vacancies. Third, job seekers from some universities (UW–Lacrosse and UW–Oshkosh) are more likely to consider employment in rural schools than are others (UW–Eau Claire and UW–Milwaukee). These trends appear fairly consistent across models and samples.

***Table 4*. Factors Related to the Proportion of Applications Submitted to Rural Vacancies**

	(1)	(2)	(3)	(4)	(5)	(6)
Student Teaching Rural	0.0522***	0.0521***		0.0628***		
	(0.0101)	(0.0101)		(0.00672)		
Race: Other	0.00904				-0.0474	
	(0.0372)				(0.0255)	
Race: Black	-0.0886				-0.0983***	
	(0.0513)				(0.0266)	
Race: Hispanic	-0.0220				-0.0340	
	(0.0435)				(0.0251)	
Gender: Female	0.00886				-0.00903	
	(0.0103)				(0.00676)	
Number of applications submitted by each teacher	0.0000467	0.0000553	0.0000393	0.000113	0.0000293	0.000194*
	(0.000200)	(0.000200)	(0.000201)	(0.000130)	(0.000138)	(0.0000988)
GPA	-0.00356	-0.000961	0.000853	0.00453	-0.00271	0.00513
	(0.0114)	(0.0112)	(0.0112)	(0.00792)	(0.00717)	(0.00527)
Experience	-0.00115	-0.00117	-0.00138	-0.000807	-0.00121**	-0.000860*
	(0.000940)	(0.000939)	(0.000942)	(0.000795)	(0.000416)	(0.000354)
Barron's Ranking	0.0119*	0.0120*	0.0141*	0.0161***	0.0165***	0.0189***
	(0.00605)	(0.00604)	(0.00605)	(0.00395)	(0.00396)	(0.00274)
Prior Teaching: City	-0.105***	-0.107***	-0.117***	-0.102***	-0.135***	-0.137***
	(0.0149)	(0.0148)	(0.0148)	(0.0138)	(0.00953)	(0.00908)
Prior Teaching: Suburb	-0.111***	-0.112***	-0.120***	-0.109***	-0.132***	-0.134***
	(0.0153)	(0.0153)	(0.0153)	(0.0143)	(0.00980)	(0.00936)
Prior Teaching: Town	-0.0569***	-0.0568***	-0.0618***	-0.0563***	-0.0772***	-0.0778***
	(0.0153)	(0.0153)	(0.0153)	(0.0143)	(0.0103)	(0.00985)
Prior Teaching: Unknown	-0.0551*	-0.0559*	-0.0641**	-0.0582**	-0.0666***	-0.0735***
	(0.0231)	(0.0231)	(0.0232)	(0.0211)	(0.0139)	(0.0129)

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	(1)	(2)	(3)	(4)	(5)	(6)
UW–Eau Claire	-0.0454*	-0.0443	-0.0408	-0.0193	-0.0392**	-0.0193
	(0.0226)	(0.0226)	(0.0227)	(0.0145)	(0.0142)	(0.0107)
UW–La Crosse	0.0536*	0.0542*	0.0547*	0.0520***	0.0251	0.0389***
	(0.0217)	(0.0217)	(0.0218)	(0.0145)	(0.0141)	(0.0108)
UW–Madison	-0.000203	0.000952	-0.00871	-0.00202	-0.0145	-0.0143
	(0.0239)	(0.0239)	(0.0239)	(0.0156)	(0.0155)	(0.0115)
UW–Milwaukee	-0.0607**	-0.0600**	-0.0706***	-0.0740***	-0.0663***	-0.0761***
	(0.0199)	(0.0199)	(0.0198)	(0.0133)	(0.0119)	(0.00910)
UW–Oshkosh	0.0454*	0.0466**	0.0441*	0.00326	0.0351**	0.0174
	(0.0180)	(0.0180)	(0.0181)	(0.0122)	(0.0121)	(0.00923)
UW–Stevens Point	-0.0140	-0.0131	-0.0134	0.00729	0.0159	0.0222*
	(0.0217)	(0.0216)	(0.0217)	(0.0138)	(0.0135)	(0.0101)
UW–Stout	0.0181	0.0200	0.0209	0.0323	0.00738	0.0243
	(0.0288)	(0.0287)	(0.0288)	(0.0186)	(0.0177)	(0.0132)
UW–Whitewater	-0.00861	-0.00753	-0.0159	-0.00984	-0.0209*	-0.0186*
	(0.0164)	(0.0164)	(0.0163)	(0.0109)	(0.0106)	(0.00807)
Constant	0.196***	0.192***	0.203***	0.158***	0.208***	0.161***
	(0.0506)	(0.0505)	(0.0506)	(0.0378)	(0.0315)	(0.0244)
Observations	3241	3241	3241	6352	8393	14300

Note: OLS regression with standard errors in parentheses. Prior teaching locale is classified as unknown for teachers who are new to teaching or those who are transitioning from private schools. The universities shown above represent the eight universities most highly represented in this sample; the comparison group for universities is all other universities.

* p<0.05 ** p<0.01 *** p<0.001

In turning to our second research question, we examine the factors related to the size of the applicant pool in any given vacancy. Specifically, we are interested in examining how the characteristics of the applicant pool vary across geographic locales and if these locale differences may be attributable to factors such as income, student demographics, proximity to labor supply, or differential preferences. Our findings from this line of inquiry are summarized in Table 5. Model 7 shows a comparison among the various locales (with rural districts being the omitted comparison group), and shows that only suburban locales have significantly larger applicant pools. In models 8–11 we include successively more parameters. Model 8 incorporates the median local income of the surrounding community. Model 9 incorporates district characteristics, including teacher salary, per pupil funding, and student poverty. Model 10 builds in proximity to EPPs and model 11 controls for differential labor demand.

***Table 5*. Factors Related to the Number of Teacher Applicants per Vacancy**

	(7)	(8)	(9)	(10)	(11)
City	1.179	1.294	1.311*	1.044	1.068
	(0.167)	(0.175)	(0.165)	(0.131)	(0.112)
Suburb	1.642***	1.395***	1.342**	1.126	1.132
	(0.156)	(0.136)	(0.135)	(0.122)	(0.100)
Town	0.952	0.927	0.878	0.855	0.878
	(0.0873)	(0.0743)	(0.0777)	(0.0744)	(0.0648)
Median Local Income		1.142***	1.009	0.963	0.955
		(0.0304)	(0.0538)	(0.0483)	(0.0429)
Median Teacher Salary			1.107	1.053	1.061
			(0.0616)	(0.0620)	(0.0532)
$/pupil			0.982	0.986	0.980
			(0.0290)	(0.0293)	(0.0268)
% FRL			0.275**	0.277**	0.280***
			(0.135)	(0.128)	(0.107)
# of EPPs within 40 miles				1.043**	1.043**
				(0.0167)	(0.0133)
Distance to nearest EPP				0.996*	0.995***
				(0.00164)	(0.00138)
Moderate Labor Supply					2.564***
					(0.126)
High Labor Supply					8.698***
					(0.479)
Vacancies	5208	5208	5208	5208	5208
Districts	311	311	311	311	311

Poisson model used to estimate exponentiated coefficients; standard errors in parentheses; standard errors clustered at the district level

* p<0.05; ** p<0.01; *** p<0.001

The most notable finding that emerges from the sequential modeling showing in Table 5 is the lack of differentiation between rural districts and those in cities and towns. And after we control for the proximity of labor supply (model 10), all labor supply to all locales become statistically indistinguishable.

Discussion

Our results can be distilled into the following primary findings.

1. All teachers are rural averse, although this trend is less pronounced for rural teachers.
2. Locales are largely self-populating.
3. Rural teachers are less likely to be active on the job market.
4. Having a rural student teaching experience substantially increases teachers' likelihood to apply to vacancies in rural districts.
5. African-American teachers submit substantially fewer applications to rural vacancies.
6. Labor supply for rural vacancies does not appear to be notably different than the labor supply for districts in urban and town locales.
7. Proximity to EPPs increases the number of applications across all locales.
8. Rural districts do not appear to have notably different labor pools from urban or town locales, in either quality or quantity of applicants.

We often hear school and district leaders say that they struggle to fill teaching positions because of a statewide teacher shortage. The above findings suggest that the dynamics of the educator labor market cannot be easily or even accurately characterized as a "teacher shortage." Thus, the idea of a shortage may be illusory or misleading. Patterns in the labor market suggest that rurality is indeed a notable factor in hiring that interacts with labor trends, but not in a manner that is as simple as rural vacancies receiving fewer applicants. The findings we present in this paper suggest rather strongly that there is no shortage of the *quantity* of teachers willing to teach in rural schools. Furthermore, the candidates that rural principals see before them appear to be comparable in *quality* to the applicant pools that school leaders select from in urban centers and towns.

Other trends presented here, however, coupled with data limitations, present a hypothesis that rural districts may indeed face unique challenges when staffing their schools. Application patterns appear to show a preference among nearly all candidates for suburban locales. If this preference in the distribution of candidates' applications were to map similarly onto candidates' employment choices, then candidates with multiple employment offers would be apt to accept offers from suburban districts over those from rural districts. We found that this does not necessarily mean that rural schools are hiring lower quality teachers. Nonetheless, if a teacher's first choice is a suburban school, then the rural school will have to go deeper down its choice list to select a suitable candidate. Unfortunately, the data available to date include only application patterns and do not yet reflect interview and employment offers.

The Role of Place: Labor Market Dynamics in Rural and Non-rural School Districts

The extent to which differential preferences for suburban locales disadvantages rural districts could manifest differently depending on how one interprets existing research and theory on labor market selection behaviors. On one hand, a perspective that teachers are similarly competent teaching across locales is supported by statewide educator evaluation polices and work by Protik, Glazerman, Bruch, and Teh (2015) showing that highly effective teachers remained highly effective when randomly assigned from high-performing to low-performing schools. Such a perspective would lead us to think that the strongest teachers are equally sought by all schools (presuming for the moment that all schools are equally adept at identifying these applicants). From this, we would reason that of the 46% of applicants who apply to both rural and other locales, the strongest would receive offers from multiple districts and would, on average, accept positions in the preferred (suburban) locales. Such a cascade of events would push rural schools to dig deeper into their applicant pools to hire weaker candidates.

On the other hand, a perspective that teachers may work more effectively within schools that complement them culturally or professionally would be supported by Jackson's 2013 study demonstrating increasing returns to teacher quality with increasing teacher-school fit. With this perspective in mind, we may envision a dynamic where labor demand for teachers is not uniform across all districts. That is, candidates identified as optimal for one district may not be identified as optimal by other districts, and this would hold within and, importantly, *between* locales. If the "fit" model aligns with the hiring process, then rural schools are at no less of a disadvantage than are other districts in finding good teachers.

The available data do not permit a test of these competing hypotheses; however, anecdotal evidence from across the state suggests that the first model may not be strongly in play. While, as noted, school and district administrators consistently share a perspective of a labor shortage in conversations we have with them, they tend to focus on declining labor pools more so than the loss of optimal candidates to other locales. Thus, we conclude that the problem lies less with labor supply than it does with labor demand. Teachers are present in the market, yet the benefits associated with working in a rural locale has been poorly communicated, misunderstood, or are insufficient to attract educators. Addressing the "shortage" through labor supply policies—infusing more teachers into the market—will likely reap minimal rewards.

Indeed, legislators struggle to enact policy solutions to remedy teacher shortages, but these efforts may be misinformed given that what we show in this paper is that such shortages may be nonexistent. For example, the legislation passed in Wisconsin to reduce certification requirements as a mechanism to bolster the labor supply is not well supported by previous research, nor by our study. Kingdon's theories on policy-making posit that policies are not advanced to solve existing problems. Rather, politicians develop policy alternatives that fit their agenda and introduce these policies when there is a window of opportunity. Under this theory, a problem does not necessarily need to precede the proposal of a solution. In Wisconsin, legislators have claimed the changes to certification requirements will solve a labor supply problem for rural school districts. However, these legislators did not present evidence to substantiate the existence of the supply problem, and our findings do not support the idea that rural schools in

particular stand to gain an advantage by weakening certification requirements. Kingdon's theory in action demonstrates the need to thoroughly investigate the "problems" that are to be solved when new education policies are proposed (Kingdon & Thurber, 1984). Our research provides a clearer picture of the education labor market in Wisconsin so that existing problems can be targeted with meaningful policy solutions.

The eight primary findings presented above reveal much of the statewide labor dynamic and lead us to several potential policy levers both at the legislative and school district levels. We note that some districts are disadvantaged by factors beyond their control, namely the level of student poverty and their geographic distance from EPPs. We can envision several low-cost mechanisms to address these challenges. One solution may be to facilitate the development of rural/remote teaching academies, where student teachers gain access and exposure to environments they may not typically encounter. Another would be for remote districts to be more proactive in reaching out to EPPs to develop professional mentoring relationships for student teachers. Such partnerships would help bolster waning applicant pools in these schools.

Rural schools also face notable challenges when trying to diversify their workforce. Results shown above reveal that African-American teachers apply to far fewer rural vacancies. Because rural districts cannot hire applicants that do not apply, a focus on underrepresented teachers should be a priority when recruiting candidates and developing partnerships with EPPs.

The effect of district affluence, as measured by median household income, appears to be a strong predictor of the size of a rural district's applicant pool. Though all geographies show a positive relationship between average applicants per vacancy and income, the increase in applicants for an increase of one unit in household income is the largest for rural districts in low and moderate supply teaching positions and second largest in high supply positions. While this positive relationship continues for suburban districts when examining school funding, rural districts' applicant pools tend to shrink as per pupil spending increases. This effect was strongest among city districts, but rural districts receive significantly fewer applications per vacancy than suburban districts for each additional $1,000 in per pupil spending. This is likely a reflection of the fact that suburban districts tend to have higher per pupil expenditures when their property tax revenue is high, whereas cities and rural areas would have increased school spending to account for large proportions of low-income students.

The majority of prospective teachers active in the labor market in Wisconsin are not applying to rural school districts. In our sample, 54% did not apply for any vacancies in a rural school, and less than 5% applied only to rural vacancies; 40% of applicants are geographically flexible, applying to multiple geographic contexts, including rural districts. These applicants tend to be approximately 3 years less experienced than exclusively rural and exclusively non-rural applicants, and less likely to hold a Master's or doctoral degree. Applicants currently working in rural schools are most likely to try to exit their current locale. Teachers currently working in cities, suburbs, and towns are both more likely than rural teachers to apply to geographic contexts in which they currently work and to submit no applications to rural districts. The

geographically flexible group, then, appears to be primarily new or early career teachers who are willing to apply to schools that are further from their current district and located in rural areas. The two more selective groups—exclusively rural and exclusively non-rural applicants—are perhaps able to be more selective in the labor market because of their comparatively greater levels of experience and education.

Our findings also expand our understanding of distributional dynamics in the teacher labor market. While most research on educational inequality has focused on urban school districts, rural schools also serve significant portions of low-income students (Rogers, 2005). Our study contributes to the growing body of work that seeks to improve the quality of education for rural students in poverty. This is an issue of particular importance nationally as the population of rural districts continues to shrink and funding declines. A better understanding of the geographic preferences of teachers can inform districts' recruitment practices, potentially providing rural school districts with the tools to attract and retain high-quality educators.

Future work would be well poised to explore why teaching applicants are rural averse and what strategies district leaders and state policy makers can deploy to address these challenges. Given the unrelenting claims of teacher shortages in the media, it is important to reiterate that policy solutions poised to solve a shortage of teachers (as with the relaxing of certification requirements in Wisconsin) are unlikely to be successful when an ample supply of teachers exists who are systematically favoring some schools over others. Rather than strive to infuse the market with additional teachers who may or may not have the same rural aversions, our research reveals a system that needs to develop strategies to make rural contexts more enticing to teachers on the job market.

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