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Situating the Rural Teacher Labor Market in the Broader Context: A Descriptive Analysis of the Market Dynamics in New York State

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Expanding accountability systems that impose policies across all schools have amplified assertions that rural teacher labor markets differ from non-rural labor markets in meaningful ways that complicate rural schools' efforts to comply with the policy directives. The analysis presented here examines this claim by exploring teacher labor market trends over a 20-year period across community type in the New York state. Rural schools rely on beginning teachers to meet their demand more so than schools in non-rural communities. The percentage of teachers with no previous experience is higher in rural than non-rural communities, and experienced teachers transfer from rural to non-rural schools. Same-school retention rates are lower in rural schools than in suburban schools and experienced teachers transfer away on net from rural schools to suburban schools. Salaries may be a contributing factor to these labor market trends. Rural salaries, both beginning and average, have consistently been the lowest in the state yet are among the highest once adjusted for regional costs differences. The analysis presented here provides valuable contextual information for future analyses as well as for policymakers wishing to provide flexibility to rural schools to comply with universal policies.

As states have ramped up their standards, testing, and accountability systems, rural schools have received additional attention, scrutiny, and resources from policymakers. Strengthening rural teacher labor markets, in particular, has been advanced as an effective avenue through which policymakers can influence the quality of education delivered to rural students and help close achievement gaps with suburban students. For example, many states and the federal government finance incentive systems designed to place and retain high quality teachers in rural classrooms (Loeb & Miller, 2006). To understand how appropriate and effective these or other policies may prove to be, we must first develop a fuller understanding of the workings of rural teacher labor markets. A useful tool in this endeavor is to examine the rural teacher labor market relative to the markets in suburban and urban communities. This article reports on such a comparative analysis conducted in New York State. How do teacher recruitment, retention, and mobility patterns and the factors theorized to influence teacher career paths vary across community type? I analyze 20 years of detailed longitudinal administrative teacher-level data on all public school teachers to situate the rural teacher labor market within the statewide context.

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Policymakers appear to be hearing rural educators' concerns that universal policies are ignoring the unique challenges the rural context poses to their compliance efforts. Federal education policies have generated much of the consternation. The Highly Qualified Teacher (HQT) provision of the *No Child Left Behind Act*, for example, was roundly criticized for ignoring the significant differences between rural and non-rural teacher labor markets which presented rural schools with additional hurdles in guaranteeing all teachers had demonstrated subject matter competency in every core subject taught (Government Accountability Office, 2004; Richard, 2002). Some in the community have argued the provision's definition of a highly qualified teacher is ill-suited to the rural context (Epply, 2009). More recently, the school turnaround models endorsed in the federal School Improvement Fund grants and the Race to the Top competition were viewed as incompatible with the rural teacher labor market context and thus putting rural schools at a disadvantage for much-needed resources (Miller & Hansen, 2010).

To its credit, the federal government has attempted to carve out additional flexibility for rural schools. Some rural schools were given additional time to comply with the HQT provision (Paige, 2004). Only the smallest rural districts, however, received this flexibility. In North Carolina, a state,

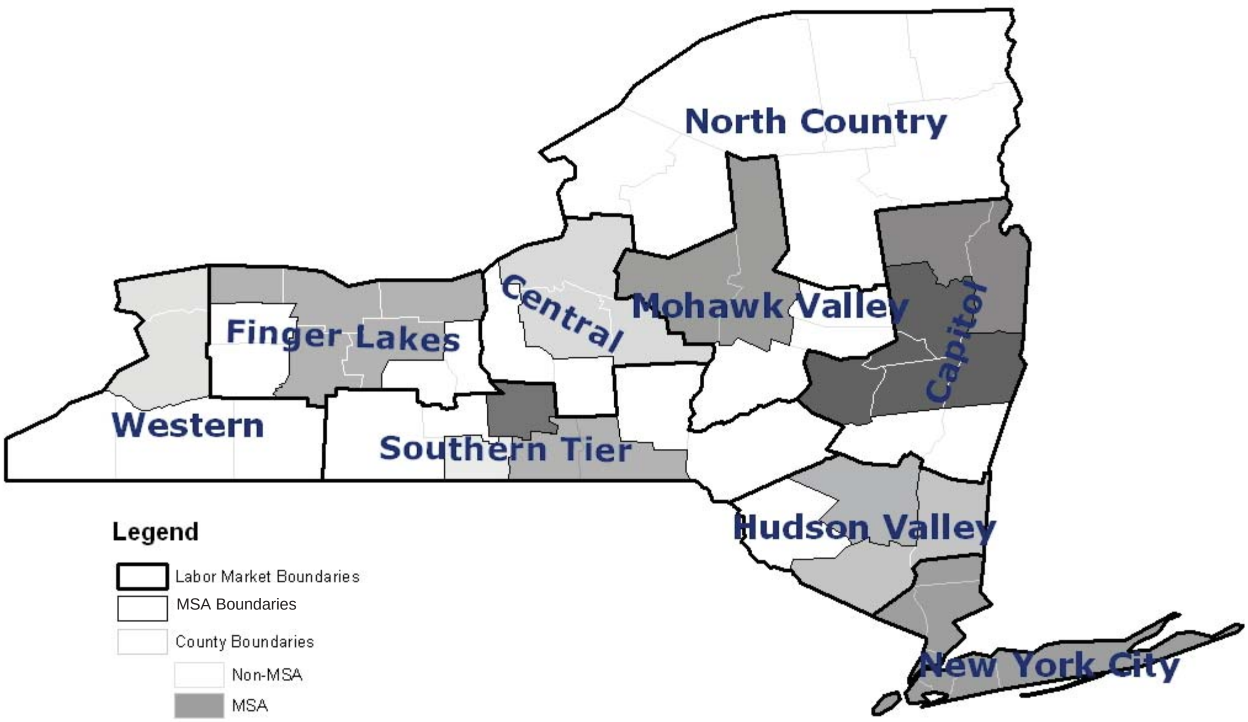

Figure 1. New York labor markets and metropolitan statistical areas.

which at the time had the second largest population and the tenth highest concentration of rural students, only one of the 101 non-charter school districts were eligible (Johnson & Strange, 2005; U.S. Department of Education, 2005). The federal government, recognizing the need to learn more about rural education, is attempting to direct additional research dollars toward rural research. For example, they granted bonus points to proposals to the Investing in Innovation (i3) grant program that targeted rural schools. A review of the 19 successful proposals receiving these bonus points, however, judged only three to be "authentically rural" in focus (Strange, 2011). Before policies can effectively advance rather than hamstring rural education, the assertion that rural teacher labor markets differ in important ways from non-rural labor markets must be tested. The analysis presented here provides valuable contextual information for these future analyses.

New York State's rural communities, though not representative of all of rural America, provide a useful case study to examine rural teacher labor markets for numerous reasons. First, although not generally viewed as a rural state given the dominance of New York City, its rural student population is the eighth largest in the country. In fact, nationally more than 50 percent of rural students attend school in just 12 states which tend to be among the most populous, most urban such as Texas, California, Ohio, Pennsylvania, and Michigan (Johnson & Strange, 2007). Should national policy makers ignore rural education in less rural states, they would be ignoring the context in which many rural students are educated.

Second, New York has twelve Metropolitan Statistical Areas (MSAs) dispersed throughout the state (see Figure 1) which may cause rural schools on the fringes of urban areas to feel more competition from their non-rural peers than is felt by more remote rural schools. Almost half of New York's rural schools are situated less than five miles from an urbanized area (Provasnik, KewalRamani, Coleman, Gilbertson, Herring, & Xie, 2007).[1] Nebraska on the other hand, a state with a larger proportion of its students attending rural schools, contains three MSAs all located near the state's eastern border. Almost 60 percent of Nebraska's rural schools are *more than* 25 miles from an urbanized area (Provasnik et al., 2007). Rural schools in Nebraska may have a harder time enticing teachers to locate in communities so far from urban areas and the amenities urban communities offer. New York's rural schools, however, may have a harder time retaining teachers as the closer proximity to urban areas increases opportunity costs. Higher teaching salaries in urban places relative to rural increase the opportunity costs of being a rural teacher and closer proximity to these salaries decreases the costs a teacher would incur in switching jobs such as moving costs. Additionally, higher

[1] The U.S. Census Bureau defines an urbanized area as a core area with a population of 50,000 or more.

wages for college-educated workers in urban areas increases the opportunity costs of remaining in the teacher labor force. In rural areas of Nebraska, teaching may be one of the best paying jobs for college-educated workers. Knowledge gained from New York's rural schools may be applicable to other states whose rural schools are similarly situated with respect to urban schools such as Alabama, Indiana, Illinois, Louisiana, Michigan, and Ohio (Provasnik et al., 2007).

Third, the issues facing rural education and receiving the attention of policy-makers in New York are not wholly dissimilar to those facing rural education in other states. National reviews of rural education with respect to issues of student diversity, socioeconomic challenges, education finance, and student achievement rate New York's rural schools and students as similar to rural schools and students in Colorado, Delaware, Illinois, Iowa, Maryland, Michigan, Pennsylvania, Utah, and Washington (Johnson & Strange, 2007). *The New York State Rural Education Program Act* acknowledges the need to enhance policymakers' capacity to develop a "cohesive state policy for educational services" that gives "special consideration" to the "unique conditions and circumstances" of rural areas (NY CLS Educ §1202). As amended in 2008, the law created the New York State Center for Rural Schools and tasked it with the responsibility of facilitating, conducting, and disseminating research and policy recommendations intended to improve the efficacy and efficiency of the rural education system. Rural schools' "difficulty attracting and retaining highly trained teachers and administrators" is mentioned specifically (NY CLS Educ §1202.4).

To assess this difficulty, I explore trends across school community type to identify aspects of rural schools and communities that may help or hinder their efforts to recruit and retain teachers who have ample non-rural teaching opportunities available to them. Schools are grouped into six community types: non-metropolitan rural, metropolitan rural, suburban, other urban, Big Four Cities, and New York City. I analyze the 20-year time period from the 1984-1985 to the 2003-2004 school year (1985 to 2004).[2] My focus on the rural teacher labor market is an important addition to body of work on New York teacher labor markets most of which has focused on the challenges facing urban schools or on New York City exclusively (see Lankford, Loeb, & Wyckoff, 2002; Boyd, Lankford, Loeb, & Wyckoff, 2005a; Boyd, Grossman, Lankford, Loeb, Ronfeldt, & Wyckoff, forthcoming).

The remainder of this paper is organized as follows. In the next section I discuss the various classification schemes researchers have used to differentiate rural from non-rural areas. Next, I summarize economic job search theory to structure a review of the existing teacher labor market literature with a keen eye for insights into how rural teacher labor markets may differ from non-rural labor markets. Following a discussion of the data and methodology and detailing the community classification scheme I developed for New York, I present findings that compare means and trends across community type in the size of New York's K-12 education system; in teacher recruitment, retention, and mobility; and in salaries and working conditions. In the next section, I discuss what these findings mean for New York and other states with regard to rural education policy and research.

Defining "Rural" is More Complicated than "Not Urban"

A lack of one consistently used definition of what is rural is the first issue rural researchers must address. It complicates the interpretation and comparison of findings from rural research. The Rural Policy Research Institute (2006) identified nine commonly used definitions. For example, the Economic Research Service at the U.S. Department of Agriculture (the home for most of the federally-supported rural research) employs the rural-urban continuum codes (a.k.a. Beale Codes) and defines rural areas as all those located in non-metropolitan counties (U.S. Department of Agriculture, 2003).[3] This definition supports the popular conception of rural as the antonym of urban.[4] The GAO defined rural districts as those 55 miles or farther from a Metropolitan Statistical Area in their analysis of rural states' and schools' struggles to implement No Child Left Behind (NCLB). All other districts were considered non-rural (GAO, 2004).

Popularly used definitions are frequently tweaked by their developers, further complicating comparisons across studies. The rural-urban continuum codes, for example, rely on terms such as urbanized area and urban clusters, and the U.S. Census Bureau has changed the definitions of these terms over the years. Many rural education researchers prefer to use the Johnson Locale Codes published by the National Center for Education Statistics (NCES) (Speicher, 2002). The Rural Community and School Trust, a national advocacy organization, in their report *Why Rural Matters* 2003 focuses on the conditions of education in schools located in rural areas (i.e., assigned to one of two rural area codes) (Beeson & Strange, 2003). By their 2007 edition, however, NCES has replaced the old locale codes with "urban-centric locale codes" which specify three

[2] Throughout this analysis, I frequently make reference to trends in Upstate New York. Upstate in this study refers to the 52 counties north of the New York City labor market. I refer to school years by the spring of the year. Additionally, all dollar figures have been converted to constant 2004 dollars.

[3] Metropolitan counties as defined by the U.S. Census Bureau following the 2000 Census are those that (1) are central counties with one or more urbanized areas (i.e., central cities and surrounding areas with a population of 50,000 or more) and (2) are outlying counties economically linked to the central counties (meaning that at least 25 percent of the outlying county population commutes to the central county for employment or at least 25 percent of the central county population commutes to the outlying county for employment.

[4] Isserman (2005) provides an in-depth review of two federal county-level classification schemes: the rural-urban continuum codes mentioned here plus the Office of Management and Budget's definitions of metropolitan and micropolitan statistical areas. He then proposes a new county-level scheme, a blending of the two federal schemes, in which counties are classified as rural, urban, mixed rural, or mixed urban.

types of rural communities: rural fringe, rural distant, and rural remote (Johnson & Strange, 2007). This is not to imply these changes do not benefit rural research as each alteration has incorporated more detailed information improving the identification of rural communities.

Rural areas are frequently defined and categorized by the size of the population and proximity to urban centers. As with any classification scheme, however, variation across rural communities within each category is generally overlooked. A noteworthy exception is the economic typology scheme developed by the U.S. Census Bureau which classifies counties by their main industry: farming-dependent, mining-dependent, manufacturing-dependent, services-dependent, and non-specialized. Additionally, several rural researchers have theorized alternate schemes in order to highlight other aspects of rural communities.

Acknowledging that a community's character is derived in large part from the people who call it home, Nachtigal (1982) proposes a three-category scheme of rural communities based on characteristics of residents. *Rural poor* communities are those with lower median income, lower average educational attainment, higher mortality rates, and lower level of self-determination. *Traditional rural* communities are conceived of as farming communities and better off than rural poor communities. *Rural communities in transition* are those located nearer to urban areas that are experiencing an influx of outsiders and the challenges to commonly held values that may bring.

Economic and demographic characteristics are the basis of the five-category classification scheme proposed by Gjelten (1982). Two types of communities—*high growth* and *reborn rural*—are located immediately adjacent to metropolitan areas. High growth communities are growing in response to the rapidly expanding nearby metropolitan area. Reborn communities are experiencing growth from individuals fleeing the congestion and problems of urban life. Benefiting from a stable tax base and engagement with the larger economy, *stable rural* communities have been able to maintain an agricultural identity while adapting to national education demands (i.e., preparing students for non-agricultural careers). *Depressed rural* communities struggle with an underdeveloped economy and high rates of out-migration. Persistent poverty challenges *isolated rural* communities that are located far from transportation and commerce centers.

The various classification schemes could generate significantly different insights into rural education and teacher labor markets, in particular. For example, rural schools located just outside urbanized areas are often part of suburban districts and benefit from the greater resources frequently found in suburban schools such as higher salaries. These rural schools are likely to look very different than rural schools located much farther from urbanized areas which may have fewer resources, not to mention a different student body. Analyses that place them both in a generic 'rural' category fail to detect these important differences. In many studies in fact, rural communities, however defined, are grouped together as a single covariate. Our understanding of rural teacher labor markets is limited as a consequence.

Job Selection Theory and Teacher Labor Markets

Teachers are the most important school-based educational resource. Schools feel tremendous pressure to succeed at recruiting and retaining teachers in order to provide a quality education to their students. The American Association of School Administrators has gone so far as to label attracting and keeping teachers as "the main problem of rural school districts" (cited in McClure, Redfield, & Hammer, 2003). Unfortunately, there is remarkably little research to help inform their efforts. The need for additional research on the rural teacher labor market and how it differs from that in non-rural areas is frequently cited as a top priority area for future research (Arnold, Newman, Gaddy, & Dean, 2005; Harmon, Henderson, & Royster, 2003; Stephens, 1985; U.S. Department of Education, Federal Interagency Committee on Education, 1991). In the meantime, while not designed to uncover differences across community type, there is a rather large and growing body of research dedicated to exploring factors that predict teacher recruitment and retention. Collectively, they demonstrate the power of wages, opportunity costs, non-wage attributes, and teacher characteristics in predicting teacher recruitment and retention.[5]

Conversations focusing on recruitment and retention policies frequently turn to a discussion of wages; yet, wages are but one job aspect valued by workers. Economic theory posits that teachers (and all workers for that matter) when selecting among job offers will choose the job giving them the most satisfaction. Satisfaction is jointly determined by the wage received and a set of non-wage job attributes, some of which the teacher views favorably and others unfavorably. Unable to dictate a job's wage and attribute set, the teacher must evaluate trade-offs. Should he choose the job at school A with a higher wage but which requires working long hours surrounded by disgruntled colleagues, the job at school B with a lower wage yet requires fewer hours and promises energetic, supportive colleagues, or the job at school C with a wage in between the other two plus the same long hours as offer A but colleagues similar to offer B? Which offer the teacher selects will be determined by how he values each of these non-wage job attributes.

Implicit prices, the heart of hedonic wage theory (Roback, 1982, 1988; Rosen, 1974, 1979), convert worker preferences over these attributes to monetary values so they can be combined with the wage rate to calculate the satisfaction the teacher will receive from the job. They measure the teacher's willingness to pay for more of a desirable attribute or, conversely, how much he needs to

[5] See Guarino, Santibañez, and Daley (2006) for a more thorough review of this literature.

be paid to accept more of an undesirable attribute. These compensating differentials vary across type of teacher and allow them to resolve the pros and cons inherent in any job offer. One application of implicit prices is quality of life indices for geographic regions in which multiple measures (e.g., environmental conditions, health outcomes, economic factors, recreation opportunities, etc.) are assessed against salaries and housing prices to create a single rating (Blomquist, Berger, & Hoehn, 1988; Graves, Sexton, & Arthur, 1999; Roback, 1982; Rosen, 1979). This theoretic framework can be applied to teachers who must balance salary with the value of a large set of non-wage job attributes (e.g., the type students they would teach, their colleagues, school leadership, the resources available, health care, retirement, and other fringe benefits, benefits of the rural versus urban lifestyle, etc.) to assess their quality of life should they select a given job offer.

Much attention has been given to the role of salaries in teacher recruitment and retention. Low teaching salaries relative to salaries in other occupations contributed to the decline in teacher academic qualifications as employment opportunities expanded for females since the 1960s (Bacolod, 2007; Corcoran, Evans, & Schwab, 2004). Once in the classroom, teachers are more likely to remain teaching when they earn higher salaries (Grissmer & Kirby, 1992; Murnane & Olsen, 1989, 1990) and are more likely to transfer as salaries in other districts increase relative to their own (Baugh & Stone, 1982; Imazeki, 2005; Ondrich, Pas, & Yinger, 2008). Expectations of higher future wages in teaching also predict higher retention (Imazeki, 2005; Stinebrickner, 2001). Finally, teachers are more likely to leave teaching if they face higher opportunity costs (i.e., higher wages in non-teaching positions) (Dolton & van der Klaauw, 1999; Murnane & Olsen, 1989, 1990; Ondrich et al., 2008). Opportunity costs may help explain why higher ability teachers are also more likely to transfer or quit teaching, presumably because their skills are valuable to other employers (Boyd, Lankford, Loeb, & Wyckoff, 2005b; Stinebrickner, 2001). All else equal, higher salaries help recruit and retain teachers.

Fringe benefits (primarily health insurance) and retirement benefits, part of a teacher's total compensation package, have received increased attention especially given skyrocketing health care costs, the retirement of the Baby Boom generation, and the fiscal constraints facing states and districts. Identical to the theory behind wages, more valuable fringe benefits both absolutely and relative to other industries should assist schools' teacher recruitment and retention efforts. In fact, the value of teachers' fringe benefits has steadily increased since the 1990s, closely tracking the value for private industry management, professional, and related occupations, and is currently 29.5 percent of total compensation (Bureau of Labor Statistics, 2002, 2004, & 2012). Newly hired teachers in New York as well as other state and local government workers nationwide currently contribute 11 percent to their health care premiums, substantially less than the 18 percent rate for all industries (Kaiser Family Foundation & Health Research & Education Trust, 2011; New York State School Boards Association, 2011). And, although the value of teacher retirement benefits has increased since the 1980s (Clark & Craig, 2011), the enhancements were distributed unevenly such that more experienced teachers benefited more than novice teachers making the teaching profession less appealing to young teachers (Koedel, Ni, & Podgursky, 2012).

Teacher valuations of specific non-wage job attributes are revealed by their career decisions. Larger schools tend to have higher teacher turnover than smaller schools (Ingersoll, 2001). Teachers are more likely to leave schools with low student achievement, high percentages of minority students, and high poverty levels (Boyd et al., 2005b; Hanushek, Kain, & Rivkin, 2004; Scafidi, Sjoquist, & Stinebrickner, 2007). Student discipline problems and insufficient support from administration also predict teacher turnover (Feng, 2010; Whitener, Gruber, Lynch, Tingos, Perona, & Fondelier, 1997). Teachers have revealed preferences for schools near their hometowns, speaking at least in part to their preference for the familiar, and these preferences are stronger than in other professions (Boyd et al., 2005a; Reininger, 2012). All else equal, the average teacher prefers to work in a supportive, well-managed, familiar environment where she can teach students prepared to learn and feel a sense of accomplishment.

Despite this large and growing body of research, very little of it speaks directly to the issue of how teacher preferences and compensating differentials vary between rural and non-rural labor markets. Does, for example, student poverty have the same impact on job satisfaction in rural and non-rural schools? How do the salaries required to recruit high quality teachers to rural schools compare to those required to recruit the same teachers to non-rural schools? Do fringe benefits play a larger role in rural teacher labor markets where off-farm employment is valued in part for access to employer-based health insurance (O'Donoghue & Hoppe, 2005)? Instead, where rural/non-rural differences are measured at all, studies only capture differences in average retention rates with mixed results. Gritz and Theobald (1996), for example, find that teachers were less likely to remain in schools located more than 30 miles from an urban area (i.e., rural teachers) than teachers located within 30 miles (i.e., non-rural teachers); however, this relationship was significant for female teachers only. Imazeki's (2005) analysis of Wisconsin teachers found that rural teachers were no more or less likely to remain in their current district than teachers in non-rural districts. Cowen, Butler, Fowles, Streams, & Toma (2012) find teachers in Kentucky's Appalachian region (i.e., rural) compared to those in the rest of the state (i.e., not-rural) are less likely to transfer between districts but more likely to exit the Kentucky teaching workforce. These studies assume teacher preferences over wages and job attributes are fixed across rural and non-rural teachers.[6]

Starting with the opposite premise, namely that rural teachers place greater value on certain job attributes than non-rural teachers, a number of small-scale studies develop hypotheses, focused on quality of life issues, about why individuals choose to teach in rural communities and why they choose to stay. Teachers who grew up or attended schools in rural communities are much more likely to become rural teachers particularly those with low "metrocentricity" or personal identification with the city (Campbell & Yates, 2011). Availability of affordable housing, scenic beauty, clean environment, and easy access to recreational activities help lure some candidates to rural schools (Storey, 1993). Some candidates, however, choose not to seek or accept rural positions based on inaccurate and/or incomplete information. Teachers' attitudes toward teaching in rural communities are often based on narrow, stereotypical images of the rural lifestyle (Sharplin, 2002); yet, the same has been shown of their attitudes toward teaching in urban schools (Gilbert, 1995).

Not every teacher hired in rural schools spends their entire career there. Teachers who enjoy the rural lifestyle and environment, who are family-oriented, and who feel connected to the community are likely to have longer spells in rural schools (Boylan & McSwan, 1998). These many perceived benefits of life in a small town, however, are not enough to compensate some teachers for the concomitant costs. Long-serving rural teachers are those who have grown comfortable with (or tolerant of) the lack of privacy in rural communities (everyone knowing your business) and the sense their performance is constantly being informally evaluated and discussed in the community (McCracken & Miller, 1988). These rural-centric labor market hypotheses have not yet undergone rigorous large-scale testing.

The extant literature does provide evidence on the observable characteristics of teachers who judge rural schools to provide greater satisfaction and a higher quality of life than non-rural schools. Minorities are less likely to become teachers and those that do are less likely to teach in rural schools (Kirby, Berends, & Naftel, 1999; Provasnik et al., 2007). Teachers with strong academic credentials such as graduating from a selective college, earning a bachelor's degree in an academic field, or holding a master's degree, are also less likely to become rural teachers (Ballou & Podgursky, 1995; Provasnik et al., 2007). Care should be taken when interpreting these stylized facts. They are based on observed job matches reflecting both the teachers' preferences over available jobs and school administrators' preferences over available candidates. For example, it may be that teachers with master's degree prefer non-rural jobs or it may be that rural school administrators, faced with tight budgets, prefer (or are under pressure) to pay lower salaries to teachers without master's degrees.

Additional empirical research into how the determinants of teacher labor market outcomes and teacher valuations of them vary across teacher labor markets is clearly needed if educators and policymakers are to have the information necessary to design and implement effective rural education policies. The descriptive analysis presented here informs these future studies and highlights the power of statewide longitudinal data systems to enhance rural education research.

Data and Methods

The current study leverages a unique dataset assembled from a variety of sources to conduct a detailed analysis of the dynamics of the teacher labor markets in New York between 1984-85 and 2003-04. (See Table 1 and Table A-1 in the appendix.) The resultant data set contains annual information on 424,089 teachers including 104,969 beginning teachers at 5,449 schools in 758 districts. Administrative data maintained by the New York State Education Department (NYSED) on all public school teachers and their career paths within the New York State public school system are at the core.

The annual Personnel Master Files provide information on each teacher's classroom and non-classroom assignments such as their age, gender, educational attainment, salary, experience, full-time equivalency status, grade level, and subject taught. Separate certification and exam data files provide information on teacher performance on teacher certification exams (i.e., NTE General Knowledge exam and Liberal Arts and Sciences Test), the undergraduate and graduate institutions attended, degrees earned, and race/ethnicity. SAT scores, the final teacher characteristic, come from the College Board and includes test takers in New York between 1980 and 2001.[7]

Aggregate data on the schools in which these teachers work and the students they teach are similarly assembled from a variety of sources. NYSED's annual Institutional Master Files for 1984-85 to 2003-04 provide information on schools and their students such as physical location, district membership, and student enrollments, minority status, and poverty rates. Student academic performance data come from the National Longitudinal School-Level State Assessment Score Database maintained by the U.S. Department of Education; yet, are only available for the five-year period between 1998-1999 and 2002-03. Finally, the

[6] Cowan and colleagues (2012) report results from models that relax this assumption for selected non-wage job attributes. Preferences over opportunity costs (as captured by the subject taught) do not differ between Appalachian and non-Appalachian teachers. Appalachian teachers have weaker preferences for familiar surroundings (to the extent captured by teaching near their undergraduate institution) than non-Appalachian teachers. Also, geographically isolated teachers (measured by districts without an interstate within its boundary) are more likely to exit the teaching profession from Appalachian districts than non-Appalachian districts. Relative preferences over salaries are not reported.

[7] Assuming individuals do not begin their teaching careers until at least four-years of college, their first year of teaching would range between 1984-85 and 2005-06.

Table 1

Descriptive Statistics of New York Teachers and Schools, 1985 to 2004

	Years Available	N	Mean	S.D.	% Missing
Teacher-by-Year Characteristics (N = 3,375,634)					
New Teachers (%)	1985-2004	104,969	3.1		0.0
New Hires to School (%)	1985-2004	584,237	17.3		0.0
Salaries (2004$) [a]	1985-2004	3,372,024	56,484	16,325	0.1
New Teacher Characteristics (N = 104,969)					
Graduate of Most Competitive Undergraduate Institution (%)	1985-2004	92,210	14.7		12.2
SAT Composite Score	1985-2004	54,112	1016	163	48.5
Graduate Degree (%)	1985-2004	104,466	26.7		0.5
Out-of-Field teaching (%)	1985-2004	93,360	27.3		11.1
Failed Certification Exam (%) [b]	1985-2004	91,843	12.0		12.5
Starting BA Salary (2004$)	1985-2004	76,587	34,624	4,112	0.0
Starting MA Salary (2004$)	1985-2004	27,879	39,233	5,906	0.0
School-by-Year Characteristics (N = 82,467)					
% Minority	1985-2004	81,567	32.4	35.1	1.1
% Free/Reduced-Price Lunch Eligible	1994-2004	45,690	39.9	30.9	1.8
Enrollment	1985-2004	81,738	665	486	0.9
Student-Teacher Ratio	1985-2004	80,215	15.6	6.0	2.7
% Students Below Proficient					
4th Math	1999-2003	8,878	27.6	20.9	22.2 [c]
8th Math	1999-2003	4,371	55.4	23.5	21.1 [c]
4th Reading	1999-2003	9,014	38.9	21.1	21.1 [c]
8th Reading	1999-2003	4,371	55.7	20.5	21.1 [c]

[a] Missing salaries values and outlier salary values (>3 standard deviations away from statewide year-experience-educational attainment means) are imputed.

[b] Certification exams are NTE General Knowledge exam and the Liberal Arts Science Test.

[c] Missing percentages use the number of schools reporting 4th grade or 8th grade enrollment in the year as the denominator.

2002 U.S. Census Public-Use Microdata Sample provided information on salaries teachers would likely earn in non-teaching jobs. Taken together, these data describe all the categories of key determinants identified by the job search theory summarized above: teacher characteristics, wages, non-wage job amenities, and opportunity costs.

The power of these data is that they allow analysts to follow individual teachers over the course of their careers within and among New York's public schools. Movements among schools within a district, movements among districts within the state, movements in and out of administrative roles, and breaks in classroom service are all observable. Teachers not observed in the classroom the following year are considered to have left the New York state teacher labor force. Some may have taken jobs at private schools or schools in another state, some may have taken non-teaching jobs, and others may be unemployed. Although the data do not indicate the employment status of these exiting teachers, the consequence is the same: they are not staffing the state's public schools' classrooms or educating its public school students.

Data checks of teacher experience identified individual teachers who despite teaching in a New York public school do not appear in the data for a given year. Failing to correct for this will bias any analysis of teacher career paths. For example, assume I observe a teacher in period t, not the following year (period t + 1), but observe her again two years later (period t + 2). I would conclude that she left the New York teacher labor force at the end of the first period and returned to the classroom after a one-year hiatus. If her years of teaching experience increased by two years rather than one, I assume she is erroneously missing from the data

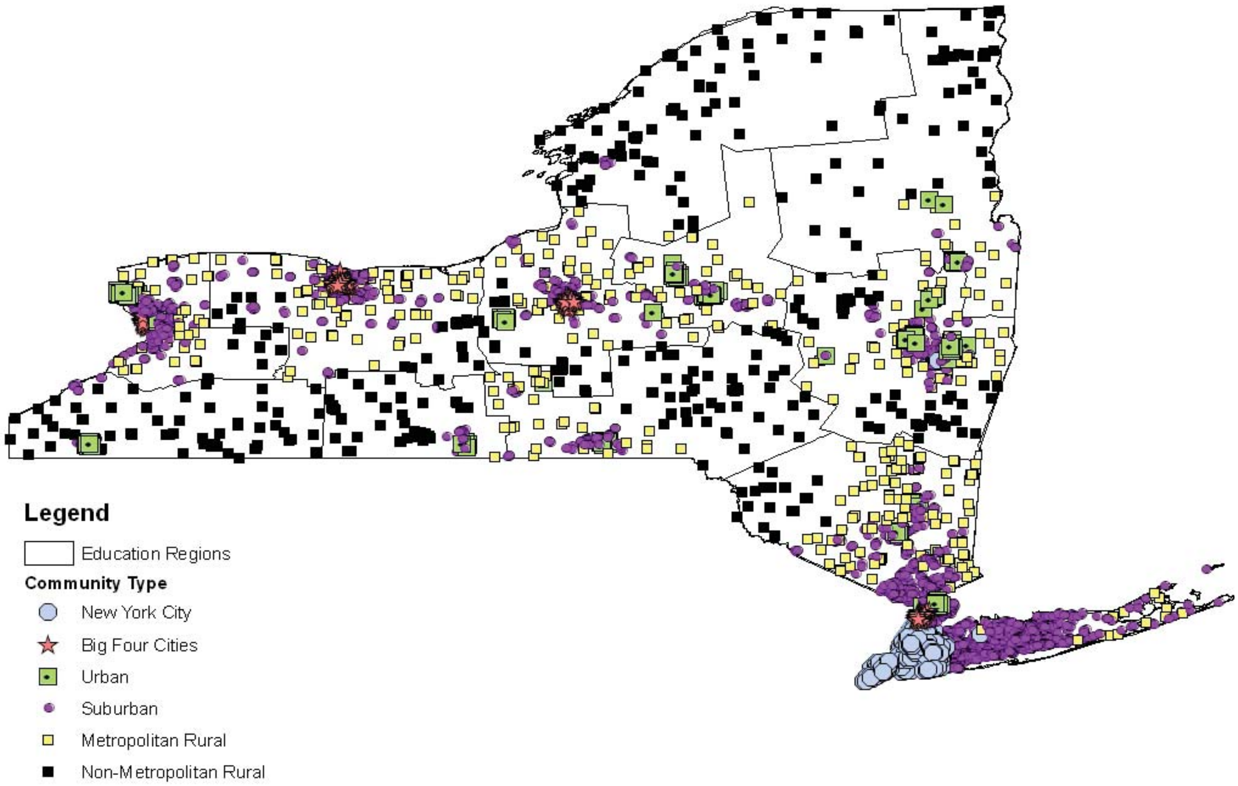

Figure 2. Community type of public schools within New York State.

in period t + 1 and impute the missing records. This helps prevent attributing teacher career path decisions to these data inconsistencies.

I developed a six-point scale of community type to enable the comparative analysis of teacher career paths. Despite the theoretic strength of the economic typology codes in capturing the heterogeneity among rural schools, I rule it out for use as a community classification scheme here as there is insufficient variation across counties within New York. Most are classified as either service-dependent or non-specialized, the latter being essentially an "all other" category. There are no farming- or mining-dependent counties in New York. I am also not able to use the Nachtigal or Gjelten schemes as I was not successful in locating the data necessary to convert their theories to actual codes.[8]

Instead I opt to classify rural communities according to their population and proximity to urbanized area as a *starting point*. Elsewhere, I incorporate additional data on rural communities to further highlight differences among them that may be important for our understanding of rural teacher labor markets (Miller, 2012a; Miller, 2012b).

The six-point scale of community type in New York State—non-metropolitan rural, metropolitan rural, suburban, other urban, Big Four city, and New York City—triangulates three classification schemes. Using the Johnson Locale Codes (obtained from NCES's annual *Common Core of Data*), I label schools as rural, suburban, or urban. Rural communities are not a homogenous group, and community characteristics are likely correlated with how close the community is to an urbanized area. The U.S. Census Bureau's urban-rural continuum codes allowed me to divide the rural schools into rural schools in metropolitan counties and those in non-metropolitan counties. My distinction between non-metropolitan rural and metropolitan rural schools resembles NCES's urban-centric trifurcation of rural schools with my metropolitan rural category analogous to the rural fringe category and my rural non-metropolitan rural category overlapping the rural distant and rural remote categories.[9] Finally, the Community Setting Codes contained in the NYSED's *Institutional Master Files* were used to separate the urban category into schools in New York City, the Big Four Cities (i.e., Buffalo, Rochester, Syracuse, and Yonkers), and other urban communities (i.e., primary cities of MSAs including Albany, Binghamton, Elmira, Glens Falls, Ithaca, Kingston, Middletown, Newburgh, Niagara Falls, Poughkeepsie, Rome, Schenectady, Troy, and Utica).[11]

[8] Isserman, Feser, and Warren (2009) combined four indicators to characterize counties in terms of their prosperity, a notion related to the Nachtigal and Gjelten schemes. The four indicators of prosperity were the poverty rate, unemployment rate, high school dropout rate, and housing problem rate.

[9] The community type classification changes for a few schools following NCES's incorporation of data from the 2000 U.S. Census in 2003. Six-point-three percent of schools changed types; however, the sample of schools making any one type of move was insufficient to warrant additional community type categories for switchers. I gave codes based on the 1990 U.S. Census priority.

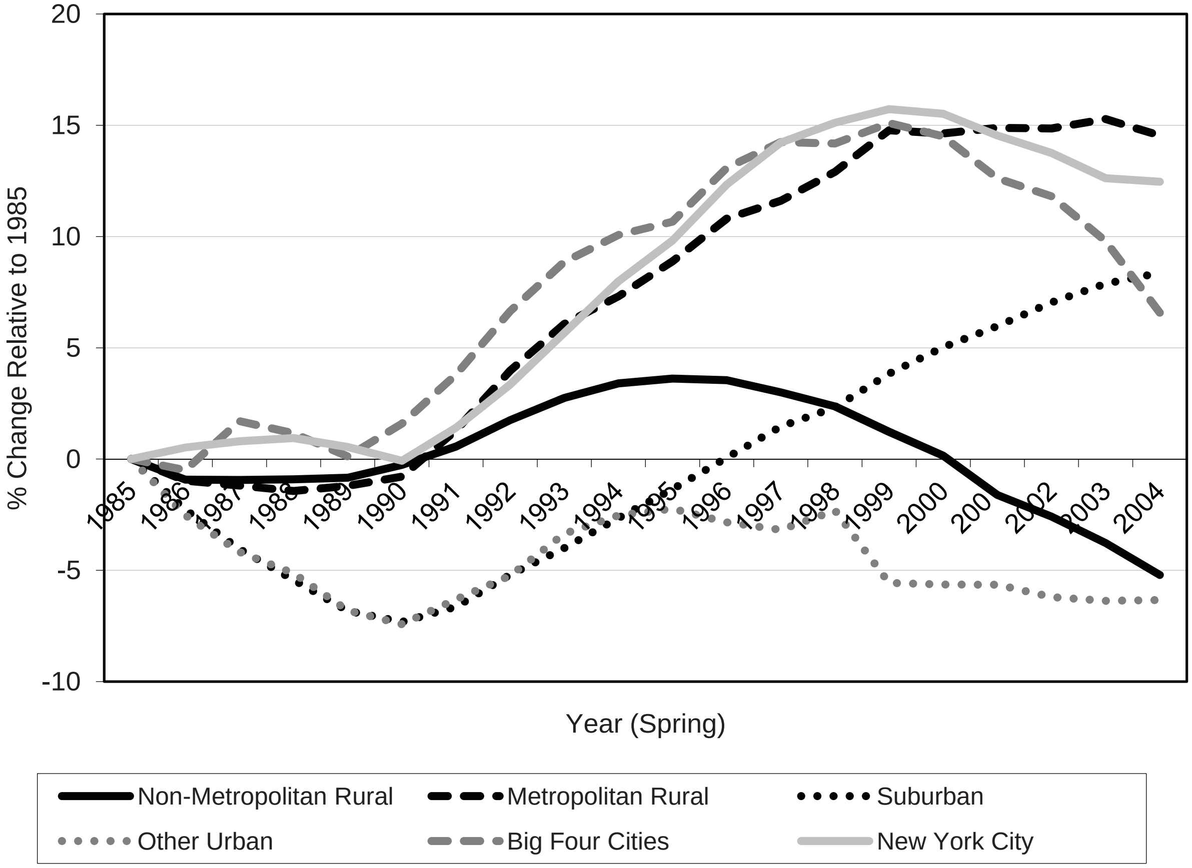

Figure 3. Enrollment growth by community type, 1985 to 2004.

Figure 2 illustrates the geospatial distribution of all public schools by community type across New York.[10]

I compare rural and non-rural teacher labor market conditions through statistical comparisons of means and annual linear trends. Conditions in non-metropolitan rural and metropolitan rural schools are compared to each other and to the other 4 non-rural community types using simple difference-in-means tests for the means and Wald tests of linear hypotheses for the estimated annual linear trends. I measure trends with the simple regression below, in which a labor market condition (e.g., teacher characteristic, salaries, working conditions) is regressed on a separate intercept ($\propto_c$) and annual linear trend (β_c) for each of the six community types.

$$L_{ict} = \sum_{c=1}^{6} (\propto_c + \beta_c time_t) + \varepsilon_{ict}$$

Standard errors reflect the clustering of observations (teachers or schools) in districts and years. I apply the Bonferroni multiple comparison correction to counteract the increased probability of falsely rejecting the null hypothesis that there is no difference between two community types.

Results

Combined these data facilitate a detailed analysis of the dynamics in the K-12 education system in New York. To provide additional context for the analysis of time trends in teacher labor markets across community type, I first describe how the size of the system has changed between 1985 and 2004. Throughout the

[10] Given that the underlying definitions of two of the three codes triangulated to create the classification scheme used in this analysis—the Johnson Locale Codes and the rural-urban continuum codes—change after the 2000 Census, I made several decisions to develop a community type classification scheme that consistently labeled schools between 1985 and 2004. The Johnson Locale codes were first introduced in 1988. There are four distinct phases in these codes between 1988 and 2004. I based my rural-suburban-urban classifications on the 1999 to 2002 phase. These codes are based on the 1990 Census and used the school's actual location rather than their mailing address as was used in earlier phases. This is an important distinction for many rural schools whose communities may be served by the postal code in a neighboring non-rural municipality. These codes were applied to the other years. Codes were imputed for schools not open during this period using the codes of nearby schools.

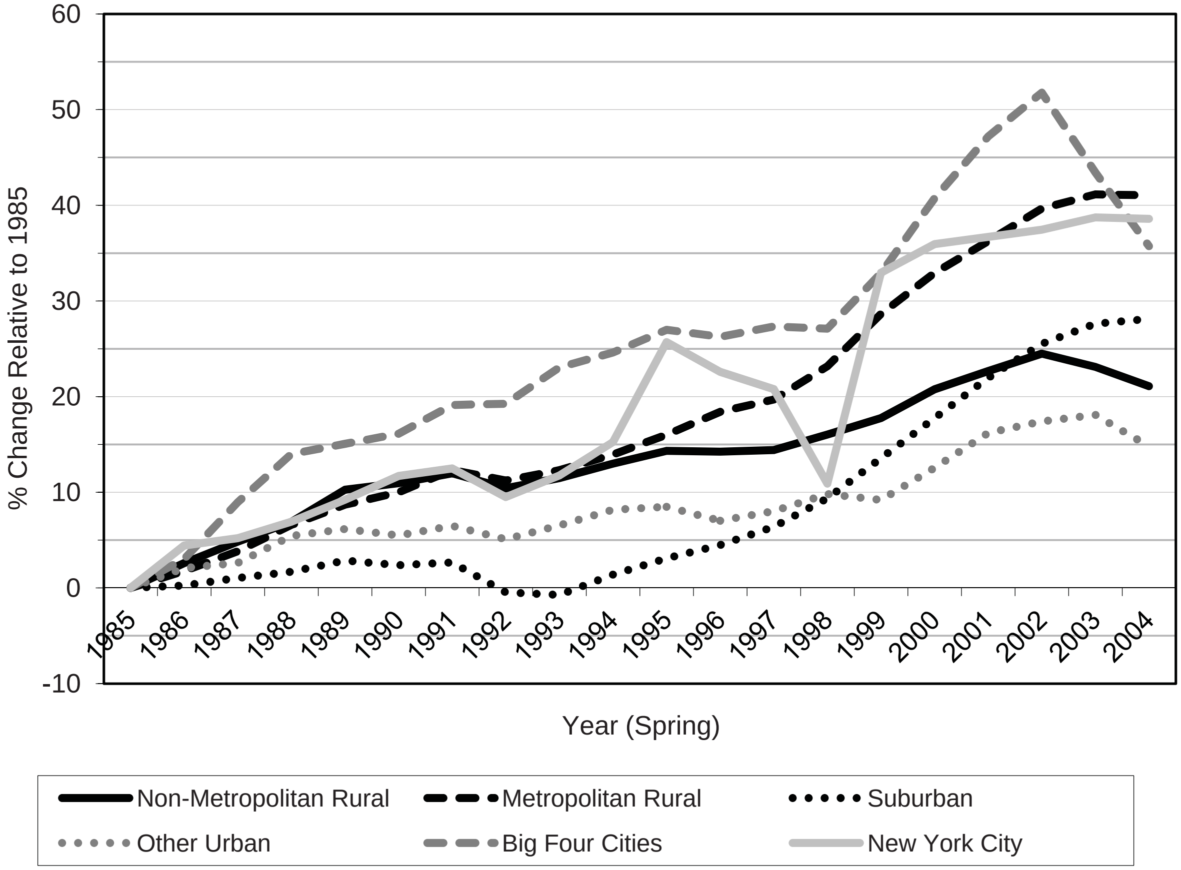

Figure 4. Teacher labor force growth by community type, 1985 to 2004. Teacher labor force size imputed for New York City in 2001 as no data were reported.

analysis, a full-time teacher is someone employed in a classroom assignment, as opposed to an administrative assignment, with a full-time equivalency of 0.9 or higher.

New York State public schools educated more than 2.8 million students in 2004, 8.5 percent more than in 1985. On average, rural students comprise 18.4 percent of all students and 43.2 percent of Upstate students (excluding the New York City labor market). Rural enrollment patterns differed significantly over the period ($p<.000$) with non-metropolitan rural schools decreasing 5.2 percent and metropolitan rural schools posting a 14.5 percent increase. The two growth patterns actually mirrored each other until the mid-1990s—decreasing in the late 1980s and increasing in the early 1990s (Figure 3). Since 1995, however, non-metropolitan enrollments have decreased while metropolitan rural student populations have continued to rise perhaps benefiting from proximity to urban areas and the economic amenities they offer. The estimate annual growth rate in metropolitan rural communities outpaced that in suburban communities (1.1 versus 0.7 percent, $p<.000$).

Additional students increase the demand for teachers. There were more than 206 thousand teachers employed in New York's public schools in 2004; a 32 percent increase since 1985. All community types participated in this explosive growth (Figure 4). Expanding student populations, however, cannot explain all of this growth as non-metropolitan and other urban communities experienced significant growth despite overall shrinking student populations. Other pressures such as community and/or teacher demands for smaller classes or the need to provide additional services to students likely played a role as well. The number of teachers employed in metropolitan rural schools grew at twice the annual rate of non-metropolitan rural schools (2.0 versus 0.9 percent, $p<.000$) and a third faster than suburban communities' annual rate (2.0 versus 1.3 percent, $p<.000$). Rural teachers comprise 19.3 percent of all teachers and 44.4 percent of Upstate teachers.

More teachers require more classrooms, and more classrooms could mean more schools. In 2004, there were 4,359 schools overseen by 701 districts, a 9 percent increase (Figure 5). This statistic masks significant differences across community type, however. New York City's school roster increased at an annual rate of 1.5 percent while the number

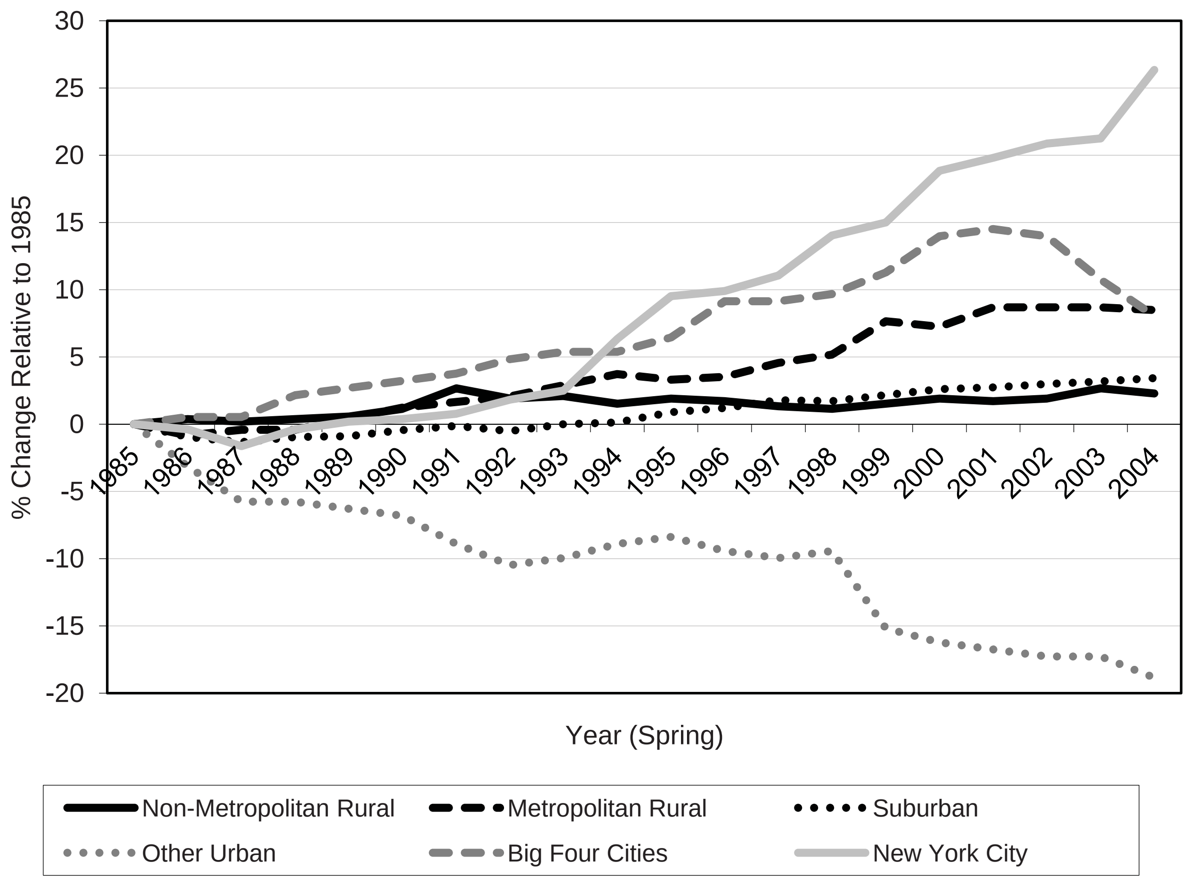

Figure 5. Growth in the number of schools by community type, 1985 to 2004.

of schools in other urban communities decreased 0.8 percent. Although both rural communities experienced increases in the number of schools, metropolitan rural communities added schools at a significantly higher annual rate ($p<.000$) than non-metropolitan rural communities (0.56 versus 0.10 percentage points, respectively). Rural schools comprise a quarter of all schools and almost half of all Upstate schools.

Many policies and procedures impacting teacher labor market outcomes (e.g., salaries and fringe benefits, working conditions, and hiring policies) are set at the district level. This 20-year period was marked by district consolidation. Consolidation—there were 24 fewer districts statewide in 2004—had the greatest impact on non-metropolitan rural communities. There were 18 fewer districts (7.8 percent) serving non-metropolitan communities in 2004 than in 1985. Other urban areas also were served by fewer districts by 2004—36.4 percent fewer from 33 in 1985 to 21 in 2004. This does not seem, however, to be the result of district consolidation, but rather from suburban districts closing their member schools located in urban areas. Metropolitan rural and suburban communities each lost one district. District consolidation is likely to continue as districts seek greater efficiencies in light of the 2011 reforms which capped spending increases from both local and state sources: local property tax levy increases cannot exceed the lesser of 2 percent or inflation and state support cannot exceed the growth rate of personal income.

These differences in trends between the two groups of rural communities and between rural and non-rural communities provide important clues into how the contexts in which school administrators look for teachers and teachers search for jobs differ. The growth in teachers in all community types may have increased the job opportunities for teachers looking for work, enabling them to select a job offering greater satisfaction than they could have obtained prior to the teacher labor force expansion. The growth may also have allowed certain types of schools to hire more of a certain type of teacher leaving less of that type to be hired at other schools. This increased competition among schools in turn may have incentivized districts to change policies with the hope of improving retention and recruitment.

Labor Market Outcomes

In this section I present trends in labor market outcomes: teacher recruitment, retention, and mobility patterns. These statistics focus on teachers who began their teaching careers between 1985 and 2002. I exclude

2003 and 2004 because the data provided to the state by New York City in 2003 is incomparable to that provided by the rest of the state. Consequently, I cannot observe teacher career path decisions for all teachers between 2002 and 2003 or between 2003 and 2004.

Recruitment. Between 1985 and 2002, the number of teachers newly hired at schools each year increased by 48.6 percent for the state as a whole. Newly hired teachers include all teachers who were not teaching at the school the previous year. This group includes teachers just beginning their careers and experienced teachers who transferred to the school or returned to teaching after a break from the labor force. These teachers filled the positions for which schools conducted recruitment activities and as such provide useful insight into teacher recruitment. On average, new hires are a slightly lower percent of all teachers in non-metropolitan and metropolitan rural and suburban schools (12.8 versus 13.4 percent, p<.000) and the share of new hires in both rural communities is significantly lower than all three urban community types (p<.000) (Table 2). These rates reflect both the previously discussed differences in the expansion of the number of employed teachers and differences in retention rates to be discussed below.

All community types increased the number of beginning teachers they hired to fill open positions, combining for a statewide increase of 177 percent, driven in large part by the need to fill the new teaching positions created during this period. The estimated annual growth rate for both non-metropolitan and metropolitan rural communities was significantly less than in suburban communities (1.8 and 6.6 percentage points versus 14.2 percentage points, p<.000 and p<.05, respectively).

Another useful recruitment statistic is the number of beginning teachers hired as a percentage of all new hires. As mentioned above, teachers have been shown to transition away from high-poverty, low-performing schools toward schools with less disadvantaged student populations as they progress through their careers. Assuming schools have a preference for experienced over novice teachers or are constrained in their ability to pay higher salaries to experienced teachers, there should be differences across schools in the percent of open positions filled with experienced versus beginning teachers. Non-metropolitan rural schools rely the heaviest on new teachers to fill their open positions. On average, 23 percent of their open positions were filled by beginning teachers, significantly higher than all other community types (p<.000). Metropolitan rural schools are also more likely to hire beginning teachers than non-rural schools except for those in New York City (19 percent, p<.000). Reliance on beginning teachers increased significantly within all community types, but at a faster rate in non-rural communities such that by 2002 the rates converge, again except for New York City.

These statistics are partly driven by the ability of teachers to transfer to other schools within their current district. Such transfers impose lower costs on experienced teachers than inter-district transfers which could results in a decreased salary. Receiving districts are not required to automatically recognize the teacher's tenure status nor all her years of experience when placing her on the salary schedule.[11] Non-rural districts have more schools than rural districts. Excluding intra-district transfers from the calculus, however, still suggests non-metropolitan rural schools rely more on beginning teachers to fill open positions than schools in other community types (31 percent, p<.000), with the exception of New York City. Greater reliance on inexperienced teachers increases the demand for induction services in rural relative to non-rural schools as well as the associated burden and cost.

Teacher qualifications are also important to our understanding of how recruitment varies across community type. Available data contain five indicators of beginning teacher qualifications—Barron's ratings of undergraduate institutions, SAT scores, whether or not they completed a graduate degree, whether or not they were certified in the subjects they were hired to teach, and whether or not they failed a teacher certification exam on the first attempt (Table 3). While these may not be strong indicators of teacher quality on their own, they are qualifications easily observable to hiring officials and may nonetheless signal the ease of hiring and the strength of teacher applicant pool.

Individual trends in beginning teacher characteristics present both concerns and encouragement for rural teacher recruitment. The competitiveness of their undergraduate institution and educational attainment demonstrate this nicely. Non-metropolitan rural beginning teachers are significantly less likely to have graduated from the most competitive colleges and universities than those recruited to schools in metropolitan rural, suburban, and Big Four City communities (13 versus 15-16 percent, p<.01). Furthermore, only rural schools became less likely to recruit graduates of the most competitive schools over the period. An annual decrease of 0.5 percentage points (p<.000) resulted in beginning teachers in non-metropolitan rural schools dropping from being the most likely to have graduated from the most competitive colleges in 1985 (16 percent) to being the least likely in 2002 (9 percent). Student achievement may suffer if these teachers are more effective than others.

Conversely, metropolitan rural schools have had more success increasing their likelihood of recruiting beginning teachers with graduate degrees than schools in suburban communities, the Big Four Cities, and New York City (p<.05, p<.001, and p<.01, respectively). This likely has implications for student achievement, too. All teachers must earn a second-stage license within 5 years. This requires

[11] When a teacher with tenure in one district transfers to another district, they need only serve a two-year probationary period rather than the three-year probationary period required of all first-time teachers (NY CLS Educ §§3014 and 3020).

Table 2

Growth in Teacher Hiring by Community Type, 1985 to 2002

	Non-Metropolitan Rural	Metropolitan Rural	Suburban	Other Urban	Big Four Cities	New York City
All New Hires						
Annual Average (#)	2,035	2,339	8,654	937	1,549	10,838
Annual Growth Rate (percentage points)[a]	1.1	2.5	2.4	0.9	3.5	2.4
% of all teachers	12.8	13.4***	13.5***	14.1***,†††	18.2***,†††	19.0***,†††
Beginning Teachers						
Annual Average (#)	465	440	1,438	147	212	2,288
Annual Growth Rate (percentage points)[a]	1.8	6.6	14.2***,†	10.2*	17.6***,†††	8.7
% of all new hires	22.8	18.8***	16.6***,†††	15.7***,†††	13.7***,†††	21.1***,†††
% of all new hires from outside district	30.7	25.6***	24.4***,††	25.5***	24.2***,†	30.0†††
% of all teachers	2.9	2.5***	2.3***,†††	2.2***,†††	2.5***	4.0***,†††

[a] Number of new hires and beginning teachers hired are index to 1985 to put all community types on same scale. Estimated annual growth rate for (1) all new hires is not statistically significant for non-metropolitan rural or other urban communities while significant for all others (p<.000 for Big Four Cities, p<.01 for the others) and (2) beginning teachers in non-metropolitan rural communities is not statistically significant while the others are all significant (p<.01 for metropolitan rural and p<0.001 for the others).

Note. Differences from Non-Metropolitan Rural: * p<.05, **p<.01, ***p<.001. Differences from Metropolitan Rural: †p<.05, †† p<.01, ††† p<.001. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

Table 3

Beginning Teacher Qualifications by Community Type, 1985 to 2002

	Graduated from Most Competitive Undergraduate Institution (%)		Combined SAT Scores (Math + Verbal) [a]		Graduate Degree **(%)**		Out-of-field Teaching **(%)**		Failed Certification Exam **(%)**	
	Mean	Annual Trend	Mean (SD)	Annual Trend	Mean	Annual Trend	Mean	Annual Trend	Mean	Annual Trend
Non-Metropolitan Rural	12.7	-0.46 *** (0.08)	1049 (138)	-2.38 *** (0.59)	22.9	0.72 *** (0.09)	7.2	0.38 *** (0.07)	4.2	0.00 (0.05)
Metropolitan Rural	15.5	-0.21 * (0.09)	1045 (145)	-1.88 *** (0.64)	26.3	0.95 *** (0.09)	6.6	0.22 ** (0.07)	4.3	0.00 (0.05)
Suburban	14.5	-0.03 (0.05)	1043 (149)	0.85 * (0.41)	33.4	0.66 *** (0.07)	5.6	0.18 *** (0.04)	5.8	-0.02 (0.03)
Other Urban	11.9	-0.20 (0.17)	1007 (152)	-1.39 (1.10)	28.3	0.74 *** (0.21)	11.2	0.48 * (0.21)	8.5	-0.04 (0.11)
Big Four Cities	15.8	-0.08 (0.25)	992 (159)	2.60 (1.49)	28.5	0.10 (0.20)	14.2	1.28 ** (0.43)	11.6	-0.30 * (0.15)
New York City	13.6	0.39 *** (0.09)	967 (180)	-0.88 (1.19)	23.1	0.29 (0.18)	52.8	0.16 (0.56)	21.3	-0.40 *** (0.08)
Non-Metropolitan Rural Statistically Different from…										
Metropolitan Rural	***				***					
Suburban	**	***			***		*		**	
Other Urban			***		***		***		***	
Big Four Cities	***		***	**	***	**	***		***	
New York City		***	***				***		***	***
Metropolitan Rural Statistically Different from…										
Suburban					***	*			**	
Other Urban	***		***				***		***	
Big Four Cities			***	*		***	***		***	
New York City	**	***	***		***	**	***		***	***
Number of Observations	79,068		39,903		89,348		88,576		77,610	

* p<.05,** p<.01,***p<.001

[a] SATscores analyzed span 1990 to 2002.

Note. Robust standard error in parenthesis below annual trend coefficient. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

completing credits toward a master's degree, a process which may distract them from important tasks such as class preparation. For example, teachers seeking a National Board teaching certificate are less effectiveness during the application year than other teachers despite their higher relative performance both before and after the application year (Goldhaber & Anthony, 2007; Harris & Sass, 2009). Beginning teachers already possessing an advanced degree need not divide their time between their classroom and graduate coursework.

The other qualifications generally indicate rural schools' recruitment efforts are succeeding relative to non-rural schools. Throughout the period, combined SAT scores are higher among rural beginning teachers than urban beginning teachers (p<.000). This perhaps reflects rural teaching positions offer greater satisfaction relative to other jobs in the same community than do urban teaching positions. Unlike urban schools, however, rural schools have experienced a significant decline in the average combined SAT scores (p<.000) which may speak to the brain drain phenomena frequently associated with rural communities in which the most academically talented students choose not to settle in rural communities after completing their schooling. Rural beginning teachers are also less likely than urban teachers to have failed a certification exam on the first attempt (p<.000). Finally, out-of-field teaching (not being even provisionally certified in any subject taught) is significantly less common among rural teachers than non-rural teachers (p<.000) which may have helped them comply with the Highly Qualified Teacher provision. By 2006, more rural core academic classes were taught by highly qualified teachers than in urban schools (97.1 versus 83.5 percent in New York City and 95.8 percent in all other urban communities) (Brackett, Mundry, Guckenburg, & Bourexis, 2008).

Retention. Although rural schools have higher retention rates than schools in the largest city districts, they retain fewer teachers than do suburban schools particularly in the first years of a teacher's career (p<.000). Retention rates in non-metropolitan rural schools do not differ significantly from those in other urban schools. The percent of beginning teachers who are retained at their initial school after each of their first fifteen years of teaching is presented in Figure 6. Suburban schools have the highest school-level retention rates and the Big Four Cities have the lowest retention of beginning teachers. For example, three years after beginning their careers, approximately 55 percent of suburban teachers return for a fourth year at their initial school. Forty-five percent of teachers who began their careers in a suburban school have either transferred to another school or left the teaching profession. The percentages are essentially reversed for teachers who began their careers in the Big Four Cities—43 percent of teachers return for a fourth year and 57 percent have transferred or quit teaching.

Rural teacher retention rates, while higher than those in the five largest cities, are lower than suburban rates through the first ten years of a teaching career. Fewer rural teachers, particularly those in non-metropolitan rural schools, are retained in their initial school. After the first year of experience, the percent of rural and suburban teachers who return for a second year are fairly comparable. Larger shares of rural teachers, however, choose to transfer or quit after their second and third years causing the widening retention difference between rural and suburban schools over the course of the first five years. Suburban schools overall are able to keep half their teachers one additional year longer relative to non-metropolitan rural schools (3.9 versus 3.0 years). These differing annual school separation rates imply non-metropolitan rural schools must replace four percentage points more of the beginning teachers hired over a five-year period than do suburban schools. Metropolitan rural schools must replace two percentage points more than suburban schools and are able to keep half their beginning teachers for half a year longer than suburban schools.

Teacher attrition is a concept related to retention. Whereas retention is typically thought of as teachers remaining in their same school or same district, attrition is frequently defined as teachers leaving the teacher labor force. Attrition with the data available represents separating from the state teacher labor force. Attrition rates among teachers who began their careers in New York City have highest attrition rates during the first 15 years of their careers followed by those starting in the Big Four Cities, significantly higher than those among rural teachers (p<.000) (Figure 7). During the first five years, teachers beginning their careers in rural schools, non-metropolitan or metropolitan, are more likely to attrit than teachers whose first job is at a suburban school (p<.000). By the end of the eighth year, however, roughly 43 percent of each group of beginning teachers has quit teaching in the state.

Half of all teachers have left the profession (at least temporarily) after 8.6 years. The comparable figure for teachers who first taught in non-metropolitan rural schools is 12.6 years and 11.8 years for metropolitan rural beginning teachers. The median length of the first teaching spell does not vary much across critical-shortage subjects—8.1 years for math teachers, 8.7 years for science teachers, and 8.2 years for special education teachers. Among teachers who taught more than one subject in their first year, half have left teaching after 7.0 years. This is concerning for non-metropolitan rural schools where 14 percent of beginning teachers are responsible for instruction in multiple subjects.[12]

Teacher turnover, be it at the school-level (retention) or system level (attrition), is costly. A common estimate of the costs of replacing employees is 25-30 percent of the

[12] Multiple subject teachers does not include elementary teachers. "Elementary" is a separate subject throughout this analysis.

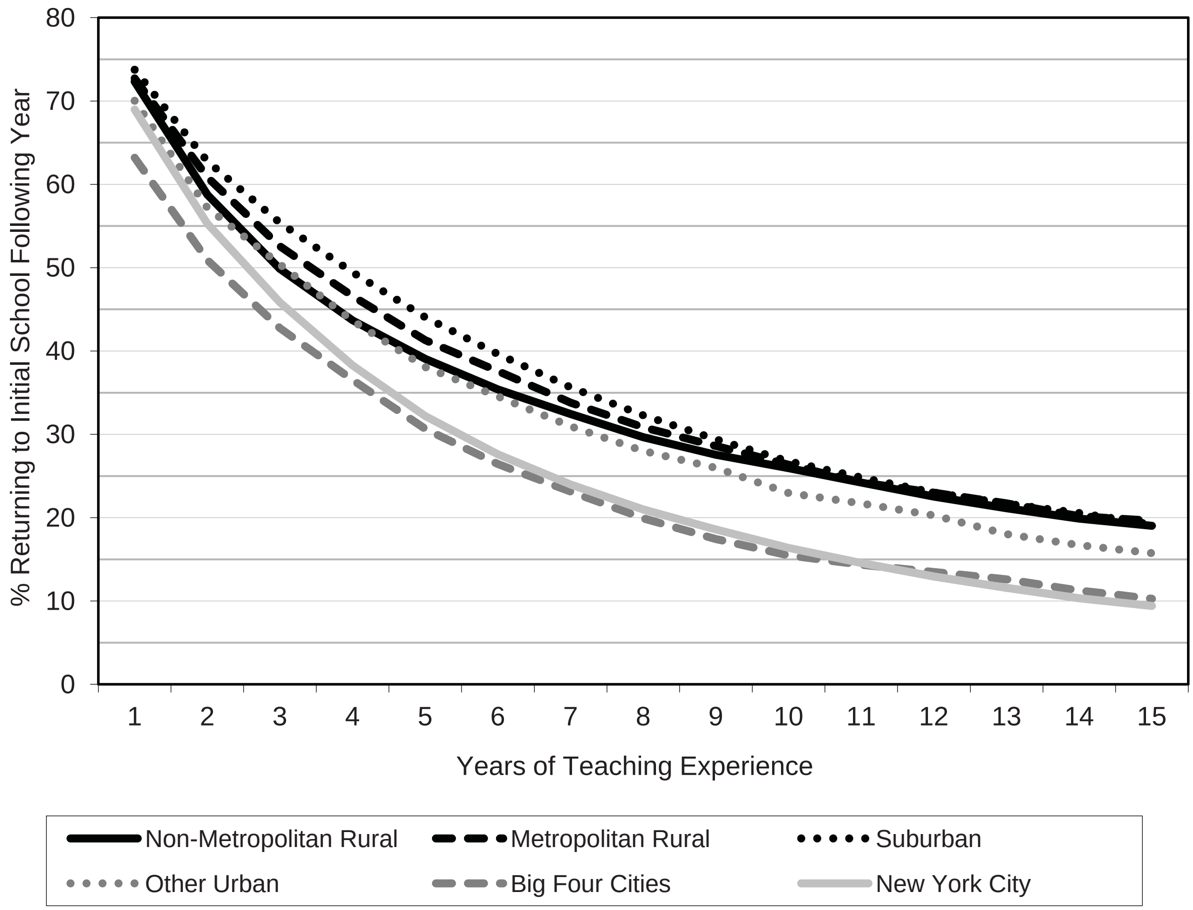

Figure 6. Percent of beginning teachers retained in the same school after the first 15 years by community type, 1985 to 2002.

employee's annual salary. And while costs may be lower in rural than non-rural communities (Barnes, Crowe, & Schaefer, 2007), turnover consumes resources that could be applied to other important educational inputs. Some schools may benefit from turnover if it results in the weakest teachers leaving the ranks or if the mobility patterns are such that they receive strong teachers from other schools.

Mobility Patterns. At the end of every school year, a teacher makes one of three decisions. He can remain where he is and be retained. He could stop teaching and attrit. Or he could decide to transfer schools. These transfer patterns are a key component of teachers' mobility patterns. Experienced teachers are found to have a tendency to transfer away from non-metropolitan rural schools and to suburban schools. Teacher mobility is also revealed by their decisions to return to teaching from a hiatus and to which school to return. Rural teachers are found to be less likely to return to teaching than urban teachers. Each finding is discussed in greater detail below.

The recruitment trends showed rural schools rely more heavily of beginning teachers to fill open positions. It is not necessarily surprising, therefore, to see a tendency for experienced teachers to transfer away from non-metropolitan rural schools. Forty-eight percent of teachers transferring from metropolitan rural schools transfer to schools in other community types (Table 4). This rate of out-migration is significantly higher than in any other community ($p<.000$). Out-migration from non-metropolitan rural schools (34 percent) is greater than suburban and the five largest urban districts ($p<.000$). There are 2,463 observations of experienced teachers transferring away from their non-metropolitan rural schools; yet, only 2,167 observations of experienced teachers transferring to these schools. Non-metropolitan rural schools are operating an experienced teacher trade deficit of 12.0 percent with other community types. New York City and other urban schools also have a trade deficit, but they are smaller (11.1 and 2.1) percent, respectively). Suburban schools on the other hand enjoy an experienced teacher trade surplus of 16.6 percent. Metropolitan rural schools and Big Four Cities also have surpluses of 5.3 and 0.9 percent respectively.

Suburban schools are the preferred destination for experienced teachers when they transfer. Conditional on changing community type, 67 percent of teachers leaving metropolitan schools transfer to suburban schools, significantly more than those leaving non-metropolitan

Table 4

Teacher Transfers between Schools Across and Within Community Type, 1985-2002

TO	FROM	Non-Metropolitan Rural	Metropolitan Rural	Suburban	Other Urban	Big Four Cities	New York City	Total
Non-Metropolitan Rural		1,626	232	218	44	26	21	2,167
	^{N}Column %	66.0	9.2	2.5	4.6	1.6	0.2	7.9
	Row %	75.0	10.7	10.1	2.0	1.2	1.0	100.0
Metropolitan Rural		302	1,313	781	95	84	80	2,655
	^{N}Column %	12.3	52.1	9.0	9.8	5.1	0.7	9.6
	Row %	11.4	49.5	29.4	3.6	3.2	3.0	100.0
Suburban		436	810	7,113	203	203	1,311	10,076
	^{N}Column %	17.7	32.1	82.3	21.0	12.4	11.6	36.5
	Row %	4.3	8.0	70.6	2.0	2.0	13.0	100.0
Other Urban		62	88	136	602	19	41	948
	^{N}Column %	2.5	3.5	1.6	62.2	1.2	0.4	3.4
	Row %	6.5	9.3	14.3	63.5	2.0	4.3	100.0
Big Four Cities		24	56	135	14	1,281	144	1,654
	^{N}Column %	1.0	2.2	1.6	1.5	78.2	1.3	6.0
	Row %	1.5	3.4	8.2	0.8	77.4	8.7	100.0
New York City		13	22	262	10	26	9,740	10,073
	^{N}Column %	0.5	0.9	3.0	1.0	1.6	85.9	36.5
	Row %	0.1	0.2	2.6	0.1	0.3	96.7	100.0
Total		2,463	2,521	8,645	968	1,639	11,337	27,573
	Column %	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Row %	8.9	9.1	31.4	3.5	5.9	41.1	100.0

Note. Sample consists of all within-spell transfers between schools made by any teacher who began their teaching career between 1985 and 2002.

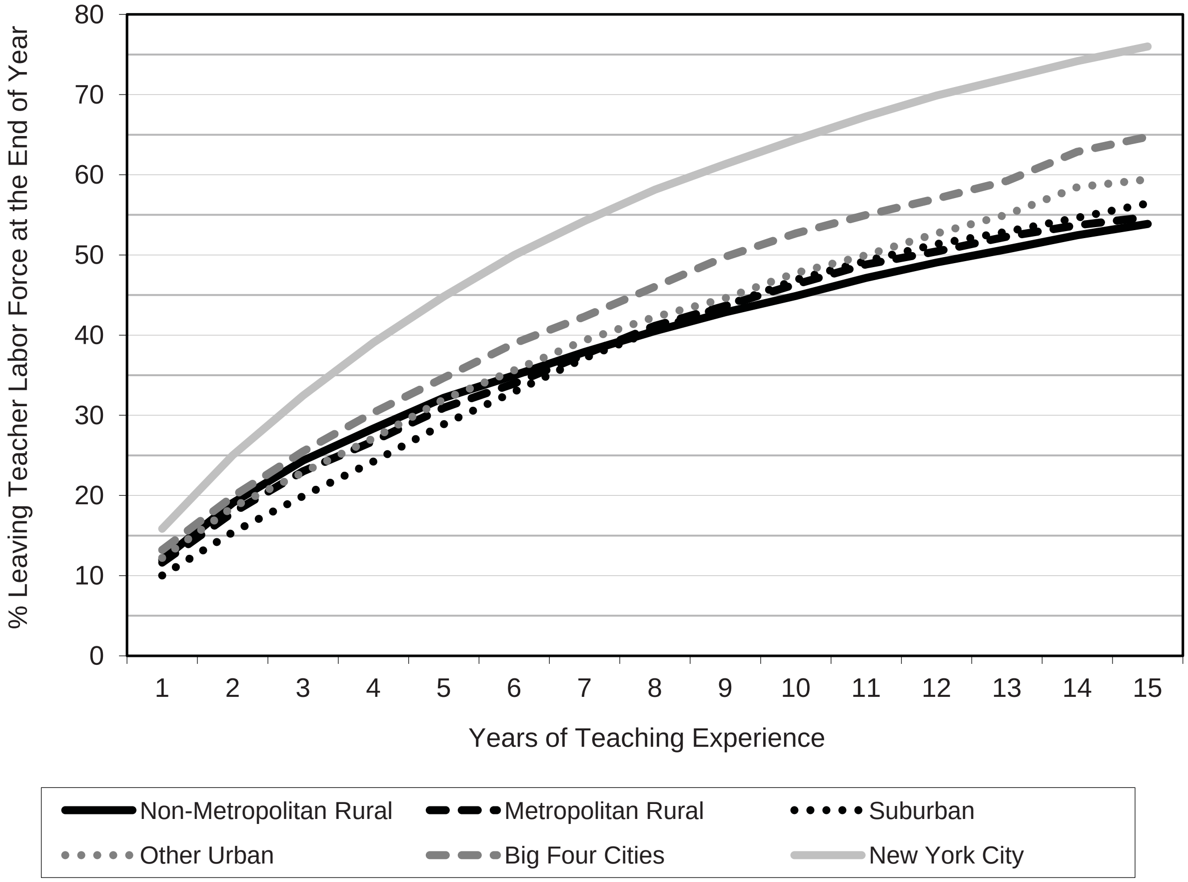

Figure 7. Percent of beginning teachers who have quit teaching after the first 15 years by initial job community type, 1985 to 2002.

rural, other urban, and Big Four City schools (52, 56, and 57 percent, respectively, all p<.000.) Less than 15 percent of transfers away from rural schools are to urban, Big Four Cities, or New York City schools.

Skeptics of the notion of a teacher shortage in this country point to the supply of certified, trained teachers who are either unemployed or employed outside of teaching (DeAngelis & Presley, 2007). The attrition and mobility numbers provided above do not reflect teachers who return to the classroom after a period of time away, for example, to care for young children. There are 19,530 teachers who are observed ending their first teaching spells. Of these teachers, 4,639 teachers (23.8 percent) return to the classroom after at least one year away. The average hiatus between teaching spells is 2.5 years.

Like other professions, a lot about being a good teacher is learned on the job. Therefore, schools can benefit from welcoming returning teachers back to the classroom. Rural leavers, however, are less likely than most non-rural leavers to return to their previous school and significantly less likely than all other leavers to return to their previous district. About 47 percent of rural leavers return to their previous districts compared to 57 to 93 percent of leavers from other community types. Encouraging for rural schools though is 70 percent of non-metropolitan rural leavers and 61 percent of metropolitan rural leavers return to schools of the same community type. These are significantly lower rates, however, than among suburban leavers (see Table 5).

Together the results of the recruitment, retention, and mobility analyses appear to put non-metropolitan rural schools at a comparative disadvantage in the teacher labor market. Compared to schools in other communities, they rely the heaviest on beginning teachers to fill open positions. And the beginning teachers they hire are the least likely to have graduated from the most competitive colleges or have a graduate degree. Non-metropolitan schools are less successful than suburban schools in retaining teachers during the first ten years of their careers. And finally, non-metropolitan rural schools operate an experienced teacher trade deficit with other communities. Labor market outcomes in metropolitan rural schools are somewhat better. This suggests many teachers judge rural teaching

Table 5

Five-Year Labor Market Return Patterns for Second Teaching Spell by Last Job Community Type, 1985-2002

	Non-Metropolitan Rural (%)	Metropolitan Rural (%)	Suburban (%)	Other Urban (%)	Big Four Cities (%)	New York City (%)
Exiting and returning within 5 years						
Number Exiting	1,871	1,576	4,525	507	697	10,354
% Returning	26.8	26.7	24.9	24.5	18.4 ***,†††	22.6 **,††
Of those returning…						
Length of hiatus	2.7	2.5	2.6	2.4	3.0	3.0 ††
% Returning to…						
Same School	37.5	40.6	43.7	43.5	25.8 †	47.5 **
Same District	43.5	51.1	57.3 ***	67.7 ***,††	67.2 ***,††	92.7 ***,†††
Same Community Type	70.1	61.3 ***	83.8 ***,†††	67.8	70.3	92.7 ***,†††

Note. Differences from Non-Metropolitan Rural: * p<.05, ** p<.01,***p<.001. Differences from Metropolitan Rural: † p<.05, †† p<.01, ††† p<.001. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

positions to provide them less satisfaction than other jobs.

Determinants of Teacher Labor Market Outcomes

As mentioned earlier, the level of satisfaction teachers derive from a given job is determined by the wage rate and the implicit values they assign to non-wage job attributes. In this section, I present findings on differences among rural and non-rural schools in the salaries paid teachers and the working conditions offered them.

Salaries. Starting salaries are a central component to the recruitment package schools offer teachers. Average salaries influence both recruitment and retention decisions. Teachers use these averages to form expectations about their future earning potential should they remain teaching in their current district. Real starting and average salaries earned by non-metropolitan rural teachers over this period have been lower than those in all other community types (Table 6, first panel). Starting salaries earned by beginning teachers hired at non-metropolitan rural schools are significantly lower than in metropolitan schools and both are significantly lower than starting salaries in other communities (p<.000). Beginning teachers in suburban schools are the highest paid. On average relative to suburban schools, those with bachelor's degrees earn $5,000 less in the most rural schools and $3,000 less in metropolitan rural schools. Differences are more pronounced for beginning teachers with a Master's degree—approximately $7,500 less in non-metropolitan rural schools and $4,500 less in metropolitan rural schools compared to suburban schools. Schools across all community types significantly raised real starting salaries over the period (p<.000) yet by similar amounts so that relative salaries among community types did not change.

Wages, though, do not capture the full value of teacher compensation. Fringe benefits account for 24.7 percent of teacher compensation on average nationwide.[13] Differences in the value of total teacher compensation between community types grow once wages plus fringe benefits are considered. Adjusting the value for regional differences across the state in the costs of goods and services, however, shifts these compensation differences in the opposite direction (Table 6, second panel). The estimated adjusted teacher compensation available to beginning teachers with a master's degree is highest in the most rural schools—$1,500 more than at suburban schools, $1,800 more than metropolitan rural schools, and $7,500 more than New York City schools (p<.000). Additionally, beginning teachers with a bachelor's degree earn $1,800 more in adjusted compensation in the most rural schools than in suburban schools, $1,400 more than in metropolitan rural schools, and $6,100 more than in New York City schools (p<.000).[14] The lower cost of living in non-metropolitan rural schools increases the value of teacher compensation, improving the quality of life obtainable relative to other communities. The adjusted value of teacher compensation in metropolitan rural schools continues to be significantly less than that in non-rural schools other than New York City (p<.01), putting them at a comparative disadvantage in teacher recruitment and retention.

Schools not only compete against each other for teachers but also with other industries in which a teacher's skills and knowledge are valued. Higher wages in these other industries has been shown to decrease recruitment and retention. I used the Public-Use Microdata Sample from the 2000 U.S. Census to measure these opportunity costs as the median non-teaching income from wages and salaries for college educated workers in the teacher's same county. Opportunity costs, unadjusted median salaries or estimated adjusted total compensation, are significantly lower in rural communities than non-rural communities both in terms of absolute costs and relative to teacher salaries (Table 7).[15] For example, adjusted opportunity costs are roughly $2,000 less in rural communities than non-rural communities other than New York City (p<.000). Relative to average adjusted teacher compensation for beginning teachers with a BA, adjusted compensation in private industries is 16 percentage points greater in non-metropolitan rural schools but 23 percentage points greater in suburban schools (p<.000). To the extent that workers emphasize community type when selecting a career, theory predicts rural teacher recruitment and retention should benefit from the lower opportunity costs in rural communities. However, if the opportunity costs represent the salaries beginning teachers' spouses and partners could receive and job selection decisions are made jointly by the couple, the lower median non-teaching salaries in rural communities might complicate rural teacher recruitment and reduce retention rates. The resolution of this push-and-pull will hinge in part on the relative value of each spouse's salary and the relative values each spouse places on non-wage job attributes.

Working Conditions. Like any worker, teachers place a value on the environment in which they work. For teachers, the characteristics of the students they teach define their working environment to a great extent. Teachers may view teaching in schools with high concentrations of minority, poor, and low-performing students as less attractive working environments. These student characteristics are frequently associated with fewer educational resources and,

[13] This figure is based on nationwide figures released by the Bureau of Labor Statistics for 1994 to 2004. Data specifically for teachers were not collected before 1994.

[14] The New York State Board of Regents first calculated labor-market-based professional cost index in 1999 and updates in 2000 and 2003. The index is based on median wages and compensation earned in other professional occupations requiring similar credentials. I used the average professional cost index values to adjust estimated total compensation: New York City/Long Island=1.502, Hudson Valley=1.429, Capital District=1.197, North Country=1.000, Central=1.174, Mohawk Valley=1.063, Southern Tier=1.115, Finger Lakes=1.214, and Western=1.119.

[15] According to the Bureau of Labor Statistics, fringe benefits for private industry workers in management, professional, and related occupations averaged 27.7 percent of total compensation between 1994 and 2004.

Table 6

Salaries for Teachers by Community Type between 1985 and 2004 (2004$s)

	Starting BA Salary		Starting MA Salary		Average Salary	
	Mean (SD)	Annual Trend	Mean (SD)	Annual Trend	Mean (SD)	Annual Trend
Number of Observations	76,587		27,879		3,372,024	
Observed Salaries						
Non-Metropolitan Rural	30,888	369.13 ***	34,205	284.07 ***	46,655	421.31 ***
	(3,763)	(10.29)	(3,851)	(17.62)	(11,028)	(12.92)
Metropolitan Rural	32,909	351.06 ***	37,220	300.46 ***	52,890	436.13 ***
	(4,382)	(15.36)	(5,233)	(24.69)	(14,430)	(25.45)
Suburban	35,848	386.50 ***	41,722	359.47 ***	62,881	385.76 ***
	(4,851)	(11.54)	(6,398)	(18.96)	(18,219)	(24.41)
Other Urban	32,752	278.44 ***	37,172	288.98 ***	53,689	471.44 ***
	(4,463)	(44.06)	(5,483)	(65.74)	(14,567)	(25.45)
Big Four Cities	34,712	340.88 ***	38,022	317.50 ***	55,219	275.93 *
	(4,216)	(66.69)	(4,882)	(78.76)	(14,523)	(135.41)
New York City	35,097	243.96 *	38,606	377.08 ***	53,497	-17.69
	(2,902)	(112.41)	(4,767)	(144.09)	(13,218)	(100.53)
Non-Metropolitan Rural Statistically Different from…						
Metropolitan Rural	***		***		***	
Suburban	***		***	*	***	
Other Urban	***		***		***	
Big Four Cities	***		***		***	
New York City	***		***		***	***
Metropolitan Rural Statistically Different from…						
Suburban	***		***		***	
Other Urban					***	
Big Four Cities	***		***		***	
New York City	***		***		***	***
Regional Cost Index Adjusted Estimated Total Compensation						
Non-Metropolitan Rural	36,818	415.05 ***	41,228	355.48 ***	56,101	493.61 ***
	(5,290)	(16.94)	(5,617)	(28.32)	(13,919)	(21.11)
Metropolitan Rural	35,430	382.23 ***	39,340	317.58 ***	56,197	436.61 ***
	(4,452)	(14.35)	(4,560)	(21.12)	(14,455)	(21.59)
Suburban	35,066	351.34 ***	39,740	334.45 ***	60,581	359.50 ***
	(4,553)	(11.65)	(4,752)	(12.30)	(15,712)	(16.47)
Other Urban	36,694	344.70 ***	40,881	280.19 ***	59,309	491.79 ***
	(4,437)	(34.96)	(4,479)	(47.85)	(14,605)	(57.35)
Big Four Cities	37,804	295.37 ***	41,097	236.10 ***	60,085	253.15 *
	(3,794)	(47.79)	(4,506)	(61.73)	(15,047)	(119.51)
New York City	30,691	213.34 *	33,759	329.75 ***	46,781	-15.47
	(2,537)	(98.30)	(4,169)	(126.00)	(11,559)	(87.91)
Non-Metropolitan Rural Statistically Different from…						
Metropolitan Rural	***		***			
Suburban	***	**	***		***	***
Other Urban					***	
Big Four Cities	***				***	
New York City	***		***		***	***
Metropolitan Rural Statistically Different from…						
Suburban	***		**		***	*
Other Urban	***		***		***	
Big Four Cities	***		***		***	
New York City	***		***		***	***

* p<.05, ** p<.01,***p<.001

Note. Robust standard error in parenthesis below annual trend coefficient. Bonferroni correction for multiple comparisons is to comparison of means and predicted means.

Table 7

Teaching Salaries Relative to Non-Teaching Salaries for College-Educated Workers in 2000 by Community Type between 1985 and 2004 (2004$s)

	Non-Metropolitan Rural	Metropolitan Rural	Suburban	Other Urban	Big Four Cities	New York City
Salaries						
Median Non-Teaching Salary	35,470	40,368 ***	46,139 ***,†††	40,655 ***,†††	41,051 ***,†††	38,491 ***,†††
Average Teacher Salaries Relative to Median Non-Teaching Salaries						
Starting BA	0.877	0.837 ***	0.800 ***,†††	0.828 ***	0.859 ***,†††	0.932 ***,†††
Starting MA	0.967	0.923 ***	0.892 ***,†††	0.913 ***	0.931 ***	1.004 ***,†††
Average Salaries	1.322	1.321	1.369 ***,†††	1.325 *,††	1.361 ***,†††	1.403 ***,†††
Regional Cost Index Adjusted Estimated Total Compensation						
Median Non-Teaching Salary	44,319	44,596 ***	46,214 ***,†††	46,665 ***,†††	46,127 ***,†††	35,056 ***,†††
Average Estimated Total Teacher Compensation Relative to Median Non-Teaching Salaries						
Starting BA	0.842	0.803 ***	0.768 ***,†††	0.795 ***	0.825 ***,†††	0.895 ***,†††
Starting MA	0.929	0.886 ***	0.857 ***,†††	0.876 ***	0.894 ***	0.964 ***,†††
Average Salaries	1.269	1.268	1.315 *,†††	1.273 ***,††	1.307 ***,†††	1.347 ***,†††

Note. Differences from Non-Metropolitan Rural: * $p<.05$, ** $p<.01$, *** $p<.001$. Differences from Metropolitan Rural: † $p<.05$, †† $p<.01$, ††† $p<.001$. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

in the current policy environment, more external oversight and pressure to improve student outcomes. Such work environments may be more stressful and thus less appealing, with the consequence that teachers are less likely to teach in and be retained at these schools.

Taken together, student demographic characteristics reveal rural schools to have many of the characteristics previous research suggests teachers prefer (Table 8). Rural schools have significantly smaller enrollments than non-rural schools, smaller student-teacher ratios (a proxy for class sizes), and fewer minority and poor students ($p<.000$). The trends behind these averages, however, present some challenges for rural schools, particularly those in non-metropolitan counties. The minority student population in rural schools experienced greater expansion than in non-rural schools. In non-metropolitan rural schools, the share increased at an annual rate of 0.14 percentage points or 2.8 percentage points over the 20 year period, 70 percent of the average for the period. In metropolitan rural schools, the share increased 62 percent of the average for the entire period. Additionally, student poverty in non-metropolitan rural schools is significantly higher than suburban schools and increased significantly over the period.

Student achievement in reading and mathematics among 4th and 8th grade students in rural schools, also shown to impact teacher labor market outcomes, lags behind that in suburban schools, even when the four student characteristics just discussed are equalized between them (Table 9). For example, 53.8 percent of non-metropolitan rural 8th graders and 48.8 percent of metropolitan rural students score below proficient on the state mathematics assessment, significantly different from each other and significantly more than suburban students (44.7 percent) ($p<.000$). These differences remain significant when student characteristics are held constant between them—57.0 and 54.2 percent versus 47.1 percent.[17] In fact, the same students are predicted to perform worse in both subjects in rural schools than in New York City schools.

The implicit prices each teacher assigns to each non-wage job attribute will determine how non-wage job attributes factor into a teacher's job satisfaction calculation. Do the relatively favorable student demographic characteristics compensate rural teachers for the relatively lower wages or are they a bonus of sorts given the relatively higher adjusted compensation? Do the lower levels of achievement among rural students serve as a strong enough counterweight to the other favorable student characteristics to lower the overall satisfaction derived from rural teaching jobs relative that received from to non-rural teaching jobs with their different combinations of wages and non-wage job attributes? Calculating these prices and assessing how they vary across different types of teachers, beyond the scope of the current paper, is an important next step in developing a deeper understanding of how differences between rural and non-rural context impact teacher labor markets.

Discussion

Educators often assert that the rural context presents unique challenges for rural schools' compliance with universal education accountability policies. The purpose of this analysis is to situate rural teacher labor markets within a statewide context in order to comment on this assertion. In doing so, I highlight meaningful and significant differences between rural communities and between rural and non-rural communities to identify aspects of schools that may help or hinder rural schools' efforts to recruit and retain teachers. The picture these analyses paint of the rural teacher labor market is one that shows the relative challenges rural schools face as well as the relative advantages they enjoy as they endeavor to provide a quality education for their students.

Rural schools are at a disadvantage, especially schools in non-metropolitan rural communities, given that teacher quality improves with the first five years of experience (Rivkin, Hanushek, & Kain, 2005; Boyd, Lankford, Loeb, Rockoff, & Wyckoff, 2008; Goldhaber & Hansen, 2010). They have the heaviest reliance on beginning teachers to fill open positions. And the beginning teachers they hire are least likely to have graduated from the most competitive colleges or have a graduate degree. Retention rates, especially during the first five years of a teacher's career are lower in rural schools than in suburban schools. Teachers leave just as they complete the steep section of the on-the-job learning curve of those first years in the classroom. And when teachers transfer between schools, they transfer away from rural schools and to suburban schools. Consequently, non-metropolitan rural schools operate an experienced teacher trade deficit with schools in other communities.

The severity of these issues is attenuated some among metropolitan rural schools. For example, they are able to recruit significantly more beginning teachers who graduated from the most competitive colleges and hold a graduate degree. Compared to more rural counterparts, metropolitan rural schools are less reliant on new teachers to fill open positions and have higher retention rates. And unlike non-metropolitan rural schools, they benefit from an experience teacher trade surplus. Labor market differences between rural schools in metropolitan and non-metropolitan counties harkens back to the rural classification schemes proposed by Nachtigal (1982) and Gjelten (1982). The current results also suggest much of the available research treating rural schools as a single homogenous group fail to capture these and other meaningful differences among them.

Rural schools, however, do have many characteristics suggesting labor market strengths relative to urban schools. They have the smallest class sizes. Student poverty rates are lower than in urban schools, and rural students outperform their urban peers. Successfully recruited rural teachers have higher combined SAT scores and are less likely to have

Table 8
Student Demographic Characteristics by Community Type between 1985 and 2004

	Percent Minority						Enrollment			Student-Teacher Ratio		
	Mean (SD)	Annual Trend		Mean (SD)	Annual Trend		Mean (SD)	Annual Trend		Mean (SD)	Annual Trend	
Number of Observations	81,567			45,690			81,738			80,215		
Non-Metropolitan Rural	4.0	0.14	***	36.3	0.25	**	436	-0.85	*	14.8	-0.19	***
	(7.5)	(0.02)		(14.9)	(0.09)		(200)	(0.35)		(3.8)	(0.01)	
Metropolitan Rural	5.5	0.17	***	23.0	0.16		534	2.56	***	15.3	-0.15	***
	(8.2)	(0.02)		(14.9)	(0.10)		(278)	(0.59)		(4.1)	(0.01)	
Suburban	17.4	0.46	***	20.1	0.26	*	622	3.05	***	15.7	-0.11	***
	(22.8)	(0.06)		(20.9)	(0.12)		(372)	(0.48)		(4.7)	(0.01)	
Other Urban	29.0	0.85	***	51.1	0.86	**	585	4.72	***	15.3	-0.17	***
	(23.6)	(0.18)		(23.3)	(0.32)		(406)	(1.03)		(3.4)	(0.02)	
Big Four Cities	61.7	1.02	***	72.4	0.55	**	633	0.15		15.5	-0.19	***
	(17.9)	(0.16)		(19.8)	(0.2)		(346)	(0.64)		(10.5)	(0.03)	
New York City	75.8	0.53	***	69.8	0.61		917	-5.90	***	16.3	-0.16	***
	(23.6)	(0.01)		(26.9)	(0.32)		(692)	(1.03)		(8.2)	(0.03)	
Non-Metropolitan Rural Statistically Different from…												
Metropolitan Rural	***			***			***	***		***	**	
Suburban	***	***		***			***	***		***	***	
Other Urban	***	***		***			***	***		***		
Big Four Cities	***	***		***			***			***		
New York City	***	***		***			***	***		***		
Metropolitan Rural Statistically Different from…												
Suburban	***	***		***			***			***	***	
Other Urban	***	***		***			***					
Big Four Cities	***	***		***			***	*				
New York City	***	***		***			***	***		***		

*Note.** p<.05, ** p<.01, ***p<.001
[a] Free/reduced-price lunch eligibility data only available from 1994 to 2004.
Notes. Robust standard error in parenthesis below annual trend coefficient. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

Table 9

School-Level Percent Students Performing Below Proficient by Community Type between 1999 and 2003

	Mathematics				Reading			
	4th Grade		8th Grade		4th Grade		8th Grade	
	Mean (SD)	Predicted Mean	Mean (SD)	Predicted Mean	Mean (SD)	Predicted Mean	Mean (SD)	Predicted Mean
Non-Metropolitan Rural	23.1	23.0	51.4	55.1	37.9	33.9	53.8	57.0
	(12.4)	(1.6)	(15.3)	(1.6)	(13.1)	(1.9)	(12.7)	(1.4)
Metropolitan Rural	18.8	20.8	47.6	53.4	31.4	30.3	48.8	54.2
	(12.1)	(1.4)	(16.8)	(1.4)	(13.0)	(1.8)	(13.8)	(1.3)
Suburban	15.8	16.7	43.1	45.4	26.4	25.1	44.7	47.1
	(13.1)	(1.2)	(21.7)	(0.9)	(15.1)	(1.5)	(18.3)	(0.8)
Other Urban	32.0	24.1	61.8	53.1	44.2	32.7	61.2	53.4
	(15.7)	(1.7)	(14.4)	(2.1)	(17.3)	(2.0)	(12.5)	(1.7)
Big Four Cities	48.9	30.2	79.8	54.5	60.5	38.3	78.1	55.1
	(19.7)	(2.7)	(17.9)	(2.9)	(18.6)	(2.7)	(16.1)	(2.0)
New York City	44.7	23.0	72.2	41.1	54.9	28.9	68.9	42.7
	(21.9)	(3.4)	(22.2)	(2.0)	(21.0)	(2.3)	(21.2)	(2.6)
Controls for								
Student Characteristics	No	Yes	No	Yes	No	Yes	No	Yes
Non-Metropolitan Rural Statistically Different from…								
Metropolitan Rural	***	**	**		***	***	***	***
Suburban	***	***	***	***	***	***	***	***
Other Urban	***		***		***		***	**
Big Four Cities	***	*	***		***		***	
New York City	***		***	***	***		***	***
Metropolitan Rural Statistically Different from…								
Suburban	***	***	***	***	***	***	***	***
Other Urban	***		***		***		***	
Big Four Cities	***	**	***		***	*	***	
New York City	***		***	***	***		***	***
Number of Observations	8,878		4,371		9,014		4,371	

* p<.05, ** p<.01, ***p<.001.

Note. Student characteristics included are percent minority, percent free/reduced-lunch eligible, enrollment, and student-teacher ratios. Robust standard error in parenthesis below predicted mean. Bonferroni correction for multiple comparisons is applied to comparison of means and predicted means.

failed a teacher certification exam. And while rural teacher salaries are lower than non-rural salaries which research shows works against their recruitment and retention efforts, the salaries are higher relative to the wages earned by other college-educated workers in the same communities which the research shows is beneficial. It is critical to take these factors into account when considering rural schools' capacity to recruit and retain teachers in a multivariate framework. But what other factors are at play?

Teachers surely take cost-of-living into consideration when they compare salary offers across jobs in different communities. How closely aligned, however, are their adjustments to those reflected in the regional cost indices increasingly used by states to determine their support for local teacher salaries? Might adjustments based on salaries of other similarly credentialed employees in the same community not fully compensate teachers for the disutility (perceived or real) of living and working in rural communities? Research suggests teacher attitudes toward rural communities are informed by narrow, stereotypical images. If these are false images and they differ from those held by non-teachers, states are under-adjusting rural teacher salaries because they believe the salaries required to recruit and retain rural teachers are lower than the amount teachers have determined they need. Coordinated efforts to apprise perspective teachers of the benefits of teaching and living in rural communities could counteract and correct these misconceptions among enough teachers to produce noticeable and meaningful changes to the pool of rural teaching job candidates. The success of such a campaign will rest with its ability to alter the implicit prices teachers assign to non-job attributes and by augmenting the set of attributes they consider in their job satisfaction calculation.

One strong candidate for addition to the calculus is the set of amenities a community offers its residence (e.g., availability of goods and services, recreation facilities, housing, sense of community, etc.). Teachers not only select a school when choosing a job but also a community. Amenities mentioned by the rural-centric hypotheses currently in the literature and discussed above provide a place to start. Educating teachers about the set of amenities available emphasizes the quality of life they can attain by teaching and living in rural communities.

Spouses are another key factor influencing teacher labor market outcomes. The very detailed data I analyze are silent on the marital status of teachers as are most data pertaining to employees. Married teachers do not make labor market decisions on their own but rather make these decisions jointly with their spouse choosing the employment option that maximizes their joint satisfaction. Information on the presence and employment preferences of spouses may meaningfully alter our understanding of the role of salaries if a teacher is the primary or secondary salary earner. Extant studies have sought to get around this lack of data by modeling job satisfaction separately for males and females; however, gender may no longer serve as a suitable proxy given changing family dynamics.

This analysis lays the groundwork for a more comprehensive examination of rural teacher labor markets. Rural labor markets have both strengths and weaknesses. Possessing an awareness and understanding of how rural labor markets have operated in the past provides guidance as to how strengths can be leveraged and weaknesses buttressed when designing policies and programs to handle the challenges that lay ahead, of which there are many. Rural student populations have continued to decline as rural economies struggle to expand beyond their traditional industries. Costs of teacher fringe benefits and teacher retirement have increased. At the same time, state financial resources are constrained, providing incentives or demands for districts to seek efficiencies. This and future analyses of similarly detailed data will ensure rural-centric information is available to inform these policy debates.

Conclusion

State administrative data, like those analyzed here, provide an incredible opportunity to enhance our understanding of rural teacher labor markets and examine the extent to which they differ from non-rural teacher labor markets. They dramatically reduce the costs of data collection as researchers need go to one organization (typically the state department of education) to obtain data on thousands of teachers that can be used to follow them over time to trace their career path. Such a sample size enables the sophisticated statistical techniques lacking in much of the current research on rural teacher labor markets (Arnold et al., 2005). A state's rural communities can be examined to detect variations across them or they can be compared to non-rural communities. While administrative data contain information on major factors of teacher career paths, the power of these data can be magnified when paired up with additional data.

Many of the extant studies on rural teacher labor markets assess teacher perceptions on rural schools, communities and students and then correlate that with teacher career path intentions. Identifying ways to collect information from a large number of teachers on their experiences prior to becoming a teacher and their perceptions of what kinds of schools and communities to teach in and then linking these data to administrative data on their careers can yield valuable insights into the types of policies, programs, and practices that should be adopted to ensure a high quality teacher for every rural classroom. With these insights, state and federal accountability systems can be designed to reflect the uniqueness of the rural context and incorporate additional flexibility and/or supports to assist rural schools' compliance efforts.

This study begins down this road in one state, and in doing so provides valuable insights not just to New York but to other states as well which are concerned for their rural education system. Over twenty years of data are analyzed to compare teacher labor market dynamics within rural communities (non-metropolitan rural versus metropolitan rural) as well as between rural and non-rural. New York is neither perfectly representative of nor totally dissimilar from every other state. The findings are most applicable to other states with sizeable rural and urban populations (e.g., Texas, California, Ohio, Pennsylvania, and Michigan), to other states in which many rural communities are relatively near to non-rural communities competing for the same talent (e.g., Alabama, Indiana, Illinois, Louisiana, Michigan, and Ohio), and to other states facing similar rural education concerns (e.g., Colorado, Delaware, Illinois, Iowa, Maryland, Michigan, Pennsylvania, Utah, and Washington). It can also help inform future work in all other states which should expand as more states bring administrative data systems online. Leveraging these systems in predominantly rural states and in states where rural communities are more remote than in New York can test for heterogeneity within rural communities beyond the important metropolitan/non-metropolitan bifurcation examined here. Combining the present analysis with analyses of rural teacher labor markets in other states is vital to the success of efforts to strength rural schools' ability to recruit and retain high quality teachers.

[17] I estimated the predicted means from subject-grade specific models where percent below proficient is regressed on community type indicator variables and student characteristics.

Table A-1

Data Sources

Name, Source, and Year Coverage	Data Element Summary
Personnel Master Files	Teacher-level data
Source: NYSED	Age
Years: 1984-85 to 2003-04	Classroom and non-classroom assignment (subject, grade-level, FTE status)
	Educational attainment
	Experience
	Gender
Certification and exam files	Teacher-level data
Source: NYSED	Degrees earned
Years: 1984-85 to 2003-04	Degree-granting institution
	Exam performance
	Race/ethnicity
SAT scores	Teacher-level data
Source: College Board	Mathematics score
Years: 1980-2001	Verbal score
Institutional Master Files	School-level data
Source: NYSED	Aggregate student characteristics (race/ethnicity, poverty)
Years: 1984-85 to 2003-04	District membership
	Student enrollment
	Physical location
National Longitudinal School-Level State Assessment Score Database	School-level data
	Average student test performance: 4^{th} and 8^{th} grade reading and mathematics
Source: U.S. Department of Education	
Years: 1998-99 to 2002-03	
Public-Use Microdata Sample	Respondent-level data
Source: U.S. Census Bureau	Educational attainment
Years: 2000	Occupation
	Salary

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