2023

THREE ESSAYS ON RURAL EDUCATION: DESCRIPTIVE STUDIES FOCUSED ON FEDERAL RURAL DEFINITIONS AND POLICY CHANGES

Kyung Ha Oh
University of Kentucky, kunghaoh@gmail.com
Author ORCID Identifier:
https://orcid.org/0009-0006-8572-3444
Digital Object Identifier: https://doi.org/10.13023/etd.2023.110

STUDENT AGREEMENT:

I represent that my thesis or dissertation and abstract are my original work. Proper attribution has been given to all outside sources. I understand that I am solely responsible for obtaining any needed copyright permissions. I have obtained needed written permission statement(s) from the owner(s) of each third-party copyrighted matter to be included in my work, allowing electronic distribution (if such use is not permitted by the fair use doctrine) which will be submitted to UKnowledge as Additional File.

I hereby grant to The University of Kentucky and its agents the irrevocable, non-exclusive, and royalty-free license to archive and make accessible my work in whole or in part in all forms of media, now or hereafter known. I agree that the document mentioned above may be made available immediately for worldwide access unless an embargo applies.

I retain all other ownership rights to the copyright of my work. I also retain the right to use in future works (such as articles or books) all or part of my work. I understand that I am free to register the copyright to my work.

REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's thesis including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Kyung Ha Oh, Student

Dr. Eugenia F. Toma, Major Professor

Dr. David R. Agrawal, Director of Graduate Studies

THREE ESSAYS ON RURAL EDUCATION: DESCRIPTIVE STUDIES FOCUSED ON FEDERAL RURAL DEFINITIONS AND POLICY CHANGES

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate School at the University of Kentucky

By

Kyung Ha Oh

Lexington, Kentucky

Co- Directors: Dr. Eugenia Toma, Professor Emeritus of Public Policy

and Dr. Ronald Zimmer, Professor of Public Policy

Lexington, Kentucky

2023

https://orcid.org/0009-0006-8572-3444

ABSTRACT OF DISSERTATION

THREE ESSAYS ON RURAL EDUCATION:
DESCRIPTIVE STUDIES FOCUSED ON
FEDERAL RURAL DEFINITIONS AND POLICY CHANGES

Rural education issues in K-12 public schools are understudied despite a large rural student population in the U.S. This dissertation studies how different federal definitions of rural change how rural school districts and their diverse communities are portrayed, in comparison to their non-rural counterparts. This study also explores the recent federal rural policy changes on rural district revenue and student academic outcomes.

This dissertation consists of three descriptive essays. The first chapter shows how we choose to define 'rural' changes what differences are accentuated between rural and non-rural districts. Definitions of 'rural' is closely related to who gains access to federal rural financial assistance. I find that both rural and non-rural school districts show differences in their district characteristics and level of district revenue when two different federal rural definitions are applied to define which districts belong to 'rural'.

The second chapter investigates a federal rural financial assistance initiative, the Rural Education Achievement Program (REAP) and its recent policy changes on funding eligibility requirements. I find new rural federal funding policy changes increased the number of poor rural districts receiving the funding. The new policy change also allowed rural districts to make more independent financial decisions by choosing their preferred program to receive the rural funding when they are qualified for both Rural Low-Income School Program (RLIS) and Small, Rural School Achievement Program (SRSA).

The third chapter explores the relationship between current rural policy changes and student achievement gaps between rural and non-rural school districts, and within rural districts. I look at the historical student achievement gap trends and find the interesting patterns that existed before and after the REAP policy changes. Rural school districts receiving additional funding from REAP program are observed to have increases in student test scores, especially for rural districts with high fractions of minority and poverty-status students.

KEYWORDS: Rural Education, Rural Definitions, Descriptive Rural Studies
Federal Rural Policy, Rural Education Achievement Program

Kyung Ha Oh

(Name of Student)

04/18/2023

Date

THREE ESSAYS ON RURAL EDUCATION: DESCRIPTIVE STUDIES FOCUSED ON FEDERAL RURAL DEFINITIONS AND POLICY CHANGES

By
Kyung Ha Oh

Dr. Eugenia Toma
Co-Director of Dissertation

Dr. Ronald Zimmer
Co-Director of Dissertation

Dr. David Agrawal
Director of Graduate Studies

04/18/2023
Date

DEDICATION

To my family for their endless love and support

ACKNOWLEDGMENTS

The following dissertation could not have been completed without support from my dissertation committee. First, I would like to express my gratitude to my committee chair, Dr. Eugenia Toma, for her guidance, encouragement, and patience through my academic journey. I would also like to thank my committee members, Dr. Rajeev Darolia, Dr. Carlos Lamarche, and Dr. Ronald Zimmer, for providing their insights that challenged my views and improved the quality of my dissertation.

I would like to thank my husband, Tom, and my son, David for their endless love, support, and sacrifice. They were always there for me when I needed a good laugh and warm hugs. I would also like to express my sincere appreciation to my parents, my grandmother, and my sister who have been my greatest cheerleaders throughout my whole life. Their never-ending prayers and emotional support led me where I am now.

I wish to give thanks to my colleagues at Monterey Peninsula College, Dr. Rosaleen Ryan and Tracey Flores, for their positive feedback and encouragement that helped me cross the finish line.

Last, but not least, I would like to acknowledge my Martin School cohort, who have become my life-long friends, especially Jeeyen Koo, Saerim Kim, and Whitney Davis. I sincerely thank them for the times we shared with tears and laughter.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

A large portion of public education in the U.S. centers on rural America. Depending on which definition of rural is applied, approximately one-half to two-thirds of the student population in K-12 public schools in the U.S. are educated in rural school districts. Despite its significant share in public education, rural schools have not received the same amount of attention in education research as non-rural (also known as urban) schools. Stoddard and Toma (2021) emphasize that current education research is primarily centered on urban school issues despite the larger student population in rural school districts. The researchers pointed out that one of the probable reasons for research efforts favoring urban education is the much easier to obtain large-scale data for large urban school districts such as New York or Chicago. Without being present in current research, it would be hard to recognize the current existing gaps between rural and non-rural school districts regarding poverty, financial capability, and student achievement among many concerns.

While acknowledging the current deficit in rural education research, through this dissertation, I attempt to make a contribution to current rural education literature in three ways as follows. First, I contribute by building a nationwide dataset that contains comprehensive information on rural school districts, especially thorough information that is closely tied to federal financial assistance programs that are specifically designed for rural school districts. Currently, there is only one systemic federal rural financial assistance initiative from the U.S. Department of Education. However, detailed rural funding data is not centralized, and to my knowledge, there is no comprehensive dataset available covering detailed rural school district funding information along with their

demographic and socio-economic characteristics. I constructed a nationwide dataset by collecting and restructuring many existing datasets from federal agencies, state education departments, and a private, post-secondary institution database. My dataset contains district-level demographic/socio-economic characteristics, district school finance (detailed revenue and spending information), federal rural definitions associated with locale codes, and rural funding eligibility and information on how much funding is distributed to each rural district from a federal initiative. My dataset is, to my knowledge, the first one that is keeping track of how districts are categorized under the narrow and the broad definitions of rural that allows us to examine (1) how those different definitions are associated with our understanding of the characteristics of rural districts, and (2) how federal rural policy changes can be related to reflect the portraits of these districts differently. I show how rural school districts are financially being supported by federal funding initiatives and examine what current rural school districts look like in terms of their demographic/socioeconomic characteristics, geographical information, and financial capacities.

Second, using my national dataset, I wrote three essays on rural education in the U.S. covering school district finance, federal rural funding policy, and student academic outcomes associated with funding policy changes. I mainly use descriptive analysis to understand the large landscape of rural education before diving into more specific issues. Loeb et al. (2017) pointed out that the education research field has been focused on causal analysis research emphasizing quasi-experimental methodologies such as regression discontinuity (RD) analysis over the past decade. The authors claim that the current research trend is reflective of the widely held perception of education researchers of

descriptive studies being less informative and less important than causal studies. However, conducting descriptive could serve as a critical first step in identifying potentially interesting research questions that could be a solid foundation and a great starting point for finding deeply rooted causes of inequity or inefficiency that have not been recognized yet. My three papers are products reflecting this fundamental idea.

Third, I attempted to promote the importance of understanding definitions in rural education policy. Up to now, when researchers dealt with rural education finance topics, they oftentimes used the definition of rural that was given by NCES (narrow definition). My study acknowledges that there are at least two different federal definitions of rural that is being used to distribute financial aids. One is the narrow definition of rural that is defined by the U.S. Census Bureau that NCES adopted since 2006,, and the other is the broad definition of rural that some parts of federal rural policy (e.g., RLIS grant) is designed around. If all of our insights about rural education and rural district finance arise from the data using the narrow definition, then we may not be getting a complete picture as the different definitions addressed in this paper relates to the way the federal rural education financing policy is supporting rural districts. How 'rural' is defined in rural education policies substantially alters what differences between rural and non-rural school districts are accentuated. In particular, I focus on the federal rural definitions related to Rural Education Achievement Program (REAP), the federal funding initiative designed to assist rural school districts, and the two programs under the REAP initiative: Rural and Low-Income School Program (RLIS) and Small, Rural School Achievement Program (SRSA). I hope to contribute to increasing comprehension of rural school data definitions

as they are fundamental information needed for conducting qualitative or quantitative research.

The first paper looks at what rural means, focusing on two different federal definitions of rural: RLIS-defined rural (broadly defined rural definition) and SRSA-defined rural (narrowly defined rural definition). I explore how these definitions depict rural and non-rural school districts differently in terms of their demographic/socio-economic characteristics and financial capacity. I observe that while rural districts appear to have lower per pupil revenue compared to non-rural districts by the broad federal definition, they are at a similar level in total per pupil revenue under the narrow definition. However, when controlling for both observable and unobservable district characteristics through regression analysis, the results show that rural school districts have higher level of per pupil revenue compared to non-rural school districts under both narrow and broad rural definitions. After looking at the differences between rural and non-rural school districts in the first paper, I take a closer look at the diversity within rural school districts in the second paper. I examine the recent REAP program policy changes on rural district funding eligibility, showing that some districts become newly eligible for funding and other incumbent districts' funding gets crowded out as REAP funds are being shared across the increased number of districts. In the third paper, I describe the changes in student achievement gap trends between rural and non-rural school districts, and within rural districts that are observed before and after the REAP policy changes implemented. The analysis is focused on reviewing the patterns of student achievement gap changes that may be associated with recent REAP policy changes. I observe that rural school districts

receiving additional funding from REAP program experience increases in their test scores for rural school districts with high-poverty and high-minority student populations.

The REAP policy changes implemented by U.S. Department of Education (ED) in 2017 occurred as a more advanced methodology was developed for collecting more accurate locality information. According to ED documentation describing geographic boundary information that is related to the rural eligibility policy changes (Geverdt, 2019), the new locale codes were created in the 2005-06 year. However, they had not been applied to REAP policy yet until 2015 when NCES developed a more advanced spatial data collection methodology for more accurate locale boundary data to examine the social and spatial contexts of local schools and districts. As a result of this new technical improvement, more detailed locale boundary information became available in 2015. So, when Congress reauthorized the Every Student Succeeds Act (ESSA) in December 2015, the new locale codes were included in the revised ESSA as a geographic location requirement for REAP rural eligibility

The purpose of this dissertation is to document the differences in the definitions of rural before and after the policy changes, describe how the overall characteristics of the average "rural" district is altered, and explore how district funding allocations changed for districts with differing student compositions such as poverty status and racial diversity.

CHAPTER 2. WHAT IS RURAL? DESCRIPTIVE ANALYSIS ON THE IMPORTANCE OF DEFINITIONS

2.1 Introduction

When we hear the word "rural," we may conjure up an image of driving hours to get to an insular community with a small population, far away from urban amenities – and problems – in crowded cities. Some may picture a remote town with a severely dilapidated cluster of houses, a small population of children who receive poor-quality education, are unlikely to attend four-year colleges, and find it hard to access gainful employment afterward. This portrait of the underprivileged rural areas, especially as it relates to the provision of education, may have steered prior research to assume a priori that rural districts are underfunded and under-delivering, compared to non-rural districts. But how close this assumption is to the current reality of rural districts? Does it reflect actual demographic/socio-economic district characteristics as well as their financial status?

Before we dive into examining rural school districts and conducting research in the rural context, first step will be defining 'what rural means.' There has been limited attention paid to the diverse definitions of 'rural.' Koziol et al. (2015) pointed out that researchers need to choose the definition of rural carefully when conducting quantitative rural research, as the chosen definition affects research design and analysis results.[1] Cromartie and Bucholtz (2008) also emphasized the importance of geographical boundary definitions for rural areas as population characteristics changed substantively when

[1] Koziol et al. (2015) are interested in providing useful guidelines for other rural researchers emphasizing the importance of knowing different definitions. Their study focuses more on helping researchers do analysis rather than looking at definitions relating to rural policy interventions. The goal of this paper is more on how different definitions could shape our understanding of rural districts' characteristics differently and alter rural school district revenues. As rural definitions that federal governments are strongly tied to funding opportunities, it is critical to start by recognizing the differences in the definitions.

different definitions were employed. A recent study by Thier et al. (2021) examined rural education literature that was conducted for several decades (1985-2017) and found that the majority of rural studies did not explicitly provide the definition of rural they used to identify their samples. The authors also discovered that only about one-third of their sample studies offered what definitions of rural were used in their studies. Even among those definitions of rurality provided, they vary from diverse definitions used in different government agencies such as The Office of Management and Budget (OMB), the U.S. Department of Education (ED), and the U.S. Department of Agriculture (USDA)) to specifically constructed, qualitative ones for their own research.

The measurement of rural areas even differs by various government agencies' definitions. For example, OMB defines counties as Metropolitan, Micropolitan, or Neither by their population size.[2] Under the OMB definition, all counties that are not part of a Metropolitan Statistical Area (MSA) are considered rural. In other words, Micropolitan counties and all counties that are not classified as either Metropolitan or Micropolitan are rural areas. In contrast, the National Center for Education Statistics (NCES) in ED chose to use U.S. Census Bureau's locality information (i.e., locale codes) which was constructed using proximity measures to urban areas. The NCES used this locality to construct their own two different rural definitions, one is a narrowly defined rural, and the other is a broader rural. And the ED uses these definitions to provide rural school districts with additional financial support. The USDA developed its own Rural-Urban Commuting Area (RUCA) Codes based on the OMB's concept of Metropolitan and

[2] Under OMB's definition, a "Metropolitan" area contains a core urban area of a population of 50,000 or more, and a "Micropolitan" area contains an urban core of a population of at least 10,000 but less than 50,000. "Neither" is the area that does not belong to either Metropolitan or Micropolitan areas. (https://www.hhs.gov/guidance/document/defining-rural-population)

Micropolitan areas to define more customized sub-county level areas. For example, the USDA defines a place with fewer than 2,500 people as a 'rural town.' And as the ED uses two different NCES rural definitions for different rural financial grant programs, USDA has a similar use as for its Telecom Hardship Loan Program. To be eligible for this program, they define rural as 'any area outside Census places of 5,000 or more people.'

As we observed above, it is critical to define 'what rural is' for research purposes as the studies cannot be reproducible when rural definitions are not clearly provided as a guideline, and the lack of attention to clearly clarify definitions could hinder the rural education research outcomes being shared across the regions/states. In this paper, I would like to show how we define 'rural' for research purposes may change what differences between rural and non-rural districts are accentuated. With this in mind, first, I will compare all school districts under two different federal definitions of 'rural' that the ED has been actively using to define rural school areas. I chose the ED rural definitions in particular among all federal rural definitions as they are specifically associated with the Rural Education Achievement Program (REAP), the major initiative that is developed systemically to provide financial support for rural school districts from the ED. As a location requirement for applying for financial grants through the REAP, rural school districts need to meet the locale codes restriction (i.e., they need to be in certain localities defined by the ED). Therefore, I will pay attention to how being in different localities reflect the diverse representation of rural and non-rural school districts with shifting socio-demographic characteristics and financial status.

Secondly, after looking at the different characteristics of rural and non-rural districts, I will focus on school district finance, specifically for revenue per pupil. I will

show historical trends of revenue per pupil as rural financial grants directly increase the revenue of school districts. I will conduct a regression analysis to see if existing gaps between the two definitions from the descriptive analyses are still present while controlling for different demographics, socio-economic factors, and geographic locations (regional and state fixed effects).

2.2 ED's definitions of rural and non-rural school districts

The ED uses the locale codes (i.e., locality information) adapted from the U.S. Census Bureau to define rural school districts as shown in Table 2.1. ED has been using two different rural definitions that are tied to the financial grants that they distribute to help rural schools. In 2002, Congress instituted the Rural Education Achievement Program (REAP), specifically aimed at helping rural school districts by providing additional, systemic federal funding to improve student achievement (Rural Education Achievement Program, 2020).[3] There are two grant programs under REAP: The Small, Rural School Achievement (SRSA) Program and the Rural and Low-Income School (RLIS) Program.

SRSA and RLIS use different definitions of "rural," based on their geographical locations, to determine eligibility for financial grants. To be eligible for SRSA, all schools served by a district need to be in areas with the U.S. Census Bureau locale codes 41, 42, and 43, codes that are traditionally considered "rural." This is what I call the "narrow" definition of rural. In contrast, RLIS uses the "broad" rural definition, which includes all

[3] Rural Education Achievement Program. Office of Elementary and Secondary Education. (2020, December 14). Retrieved December 14, 2022, from https://oese.ed.gov/offices/office-of-formula-grants/rural-insular-native-achievement-programs/rural-education-achievement-program/

schools served by districts coded as 32 and 33, in addition to 41, 42, and 43. The descriptions of two different rural definitions with locale codes are shown in Table 2.2.

Table 2.3 shows the number of districts that are located within each local code. These values are reflective of nine years of data (2010-2018). There are several districts that are created, dissolved, merged, or split in any given year. Therefore, the percentage in the right-most column may fluctuate somewhat from year to year.

2.3 Conceptual framework

To develop a conceptual framework, first I conducted a literature review in the public finance field focused on local public goods. Through the literature review, theoretical relationships between variables have been identified from the existing literature. Tiebout (1956) stated that individuals consider the quality of local public services such as public schooling when they choose which locality to live in. Oates (1969) conducted an empirical study testing a hypothesis based on Tiebout sorting. The author considered local public schooling (education) to be the most important element among various local public services and the quality of education may be an important factor to move into a locality. Beyond education, he posited that the choice of community is made based on the proximity to central cities, property tax rate, and the output of public services.

While there have been two federal definitions of rural that existed since 2006 and the definitions have also been used as a requirement for federal rural financial assistance program for the past several years, many rural education studies utilize the narrow definitions of rural, as defined by the U.S. Census Bureau. In the current rural finance literature, Kolbe et al. (2021) estimate cost differentials for small, rural schools in Vermont looking at a state finance policy providing additional financial support for rural schools.

The authors include ‘Rural’ and ‘Town’ locale codes separately in their analysis, but they did not consider ‘Town’ districts as rural. Tay et al. (2021) also applied the four locale codes area categories (city, suburban, town, rural), the same as Kolbe et al. (2021) in using the narrow definition of rural districts. Combs and Foster (2021) also use the same methodology to sort out rural districts but interpret ‘Town’ locality as small communities in urban cluster when investigating in the effect of property tax exemptions on demand of local education expenditure and student outcomes. Dhaliwal and Bruno (2021) is another example of using the narrow definition of rural, but the authors acknowledge the potential diversity within the narrowly defined rural by examining the results in more detailed rural locale codes (rural fringe, rural distant, rural remote).

With current trends of the rural definition usage in mind, I will utilize a national dataset containing detailed rural locality information to understand the diversity in rural and non-rural school districts under the narrow and broad rural definitions.

2.4 Data

I constructed a school-district level dataset from three different sources: data from the school year 2010 to 2018 from 1) the Common Core Database (CCD), available on the National Center for Education Statistics (NCES) website, 2) the Stanford Education Data Archive (SEDA), and 3) the Census Bureau.

The NCES data includes school districts’ demographic/organizational information regarding students/teachers/staff (i.e., number of students enrolled, number of schools within a district, number of full-time teachers, number of student resource staff, number of administrative personnel), fiscal information (i.e., revenue and spending), and federal

definitions of rural that are used in education, specifically related to financial aid for school districts. All monetary values (i.e., household income, school district different revenues, and spending categories) have been inflated to 2018 constant dollars.

The SEDA dataset was combined with the NCES data, adding additional demographic and socioeconomic information about school districts (i.e., ethnicity, free and reduced lunch eligibility, median household income, education attainment, and unemployment rate). The Census Bureau provided detailed information for geographical areas, regions, and localities.

Special school districts, such as military bases, prisons, and juvenile schools, are excluded from the dataset. School districts in Alaska and Hawaii have also been eliminated due to missing data and/or obvious data errors. In addition, there are school districts with abnormally high poverty rates and a high percentage of students receiving free or reduced-price lunch (FRL), and many have a substantial American Indian (AI) population. In order to deal with this special population, I found that there is relevant information in the section 8538 of the 'Every Student Succeeds Act' (ESSA. Public Law 114-95. December 10, 2015). In section 8538, there are a set of specific rules that define heavily populated districts with AI students. In the guidelines, a heavily populated AI district is classified as either 1) having at least 50 percent of enrolled AI students or 2) receiving more than $40,000 in funding under Title VI of the ESEA (Indiana education formula grant) in the previous fiscal year.

To eliminate the outliers with the abnormally high poverty rates and percent FRL that are often associated with the AI districts in my dataset, I apply these two policy elements as standards. The two federal government rules described above eliminated most

Indian school districts across the states. I conduct my analysis without these outliers as they receive a specified amount of funding, which is separate funding from the general poverty allocation.

After clarifying the poverty issue and special population exclusion, the final dataset includes 12,244 individual regular school districts, which is representative of approximately 90% of all school districts in the continental U.S.

2.5 Analysis

2.5.1 Descriptive Analysis

Under the narrow definition of rural (SRSA eligible rural), 54% of school districts are defined as rural. On the other hand, under the broad rural definition, which is RLIS eligible rural definition, the percentage points of being rural would go up to 68%. The difference between the two definitions comes down to locale codes. I will take a close look at the narrowly defined rural school districts first and move on to the broadly defined rural school districts.

Table 2.4 summarizes the differences between rural and non-rural school districts when rural is defined by SRSA. Under a narrow rural definition, rural school districts look much smaller in size compared to their non-rural counterparts considering the number of schools within a district and the number of students enrolled. Non-rural school districts have three times as many schools and five times more students than rural ones. Rural districts are also more poorly resourced in terms of personnel. Non-rural districts also have four to five times more manpower including full-time teachers, resource staff (counselors, librarians, and so on), and administrative staff who can provide additional guidance and resources to students. In terms of school district organizational capacity, this picture is

aligned with what the previous rural literature has recognized (Fowles et al., 2013; Barrett et al., 2015; Glover et al., 2016; Goldhaber et al., 2020; Nguyen, 2020; Williams et al., 2021; Yang et al., 2021).

Comparing district demographic/socio-economic status (SES), rural school districts have a slightly higher percentage point of FRL (51%) vs. non-rural ones (47%). Rural districts are less diverse, with a smaller percentage of minority students (17%) than non-rural districts (30%). Other measures of general economic health are also lower in rural districts, which have lower education attainment of college-level education and above (19% compared to non-rural, 28%) and lower median income ($54,000 compared to $64,000).

When it comes to school district finance, rural districts have similar to slightly higher levels of per pupil revenue and spending compared to their non-rural counterparts. Although the total per pupil revenue level is similar, rural districts are more dependent on state intergovernmental transfers (46%) than non-rural districts (42%) while rural districts' local financial stability and independence (I measure this as the ratio of local revenue and total revenue) is lower (46%) than non-rural districts (51%).

Table 2.5 summarizes the differences between rural and non-rural school districts when rural is broadly defined by RLIS. Under the broad rural definition, rural and non-rural districts look quite different regarding district demographic/SES and district finance. Rural school districts are much poorer, less educated, and have more disadvantaged populations with much higher FRL eligibility (52% vs. 42%) and much lower median income ($52,574 vs. $71, 218) than non-rural school districts. While comparisons remain qualitatively similar when comparing non-rural districts against rural districts under the

narrow definition, one divergence worth noting is that district manpower capacity (number of personnel such as full-time teachers, counselors, and librarians) seems to be similar.

When comparing district revenue and spending, the gap between rural and non-rural school districts is quite large under the broad definition. Rural districts have $1,260 less in per pupil revenue than non-rural, or 9% lower total per pupil revenue, which is a completely opposite outlook compared to when I use the narrow definition (i.e., rural districts have the equivalent level of funding compared to non-rural districts). Under the broad definition, rural districts appear to be much more dependent on state government funding than non-rural districts (47% vs. 39%) and less stable and less independent to raise their own local revenue (45% vs. 55%). This might reflect the general understanding of how rural schools are funded that many researchers have about and confirmed through their rural education research (Bruno and Dhaliwal, 2021; Combs, Foster, and Toma, 2019; Dupere et al., 2019; Gagnon and Mattingly, 2015; Schmitt-Wilson et al., 2018; Prins & Kassab, 2017; Jordan et al., 2012; Stair et al., 2006).

Given these discrepancies, especially in average per-pupil revenue and per pupil spending, how do these differences between narrow and broad definitions arise? It turns out that the locality codes used to define the narrow vs. broad definitions segregate pivotal districts into rural and non-rural. When we look into the detailed categories of ED's two rural definitions in Table 2.2, there are two categories of locality, ‘Distant Town’ (32) and ‘Remote Town’ (33) that only belong to rural school districts under the broad rural definition. Therefore, the differences in the micro-locality areas between narrow and broad definitions might explain why these differences exist. Table 2.6 breaks out and summarizes school district characteristics by locality codes under the broad rural definition. Broadly,

Distant Town (32), and Remote Town (33) look more similar to each other than Rural Fringe (41), Distant Rural (42), and Remote Rural (43).

Considering district capacity, localities of Distant Town, Remote Town, and Rural Fringe have similar characteristics being much bigger in terms of the number of schools and students enrolled compared to the other two smaller rural localities, Distant Rural and Remote Rural. However, those three similar in district size show quite different demographic/socio-economic characteristics. Two town localities (Distant Town and Remote Town) have a much higher percentage of FRL (55% and 59%), relatively larger minority student population (25% and 31%), and lower educational attainment levels (18% and 19%) than Rural Fringe has (45%, 20% and 23% in order). Especially, Rural Fringe is relatively affluent, with a very high level of median income ($62,115), which is close to the level of an affluent midsize Suburban locality while 'Distant Town' and 'Remote Town' have much lower incomes ($49,351, $45,812). (See Appendix 1.2).

When looking at the total revenue per pupil, the two town localities have much lower revenue per pupil than all the rural localities. The difference between 'Remote Town' (lowest revenue per pupil) and 'Remote Rural' is $4,500, about 35% more than the total revenue per pupil of the 'Remote Town' locality. Local revenue stability is also lower in the two town localities (both 40%) than in all the other rural localities (rural fringe 48%, distant rural 43%, and remote rural 48%).

As we discussed with the information from Table 2.6., the difference between narrow and broad definitions may come from the micro-localities within the rural definitions, distant and remote towns being economically disadvantaged while all the other

rural localities are more affluent than towns, especially remote rural having a surprisingly high level of revenue per pupil.

2.5.2 Why focus on per-pupil revenue as a key variable?

Oates (1969) used per pupil spending as a proxy for education output as he expected the quality of education would vary closely related to per-pupil spending. When it comes to comparing school districts in education literature, many researchers examine the effect of per-pupil spending on student outcomes, traditionally student academic achievements such as standardized test scores or graduation rates. (Dee and Levine, 2004; Nguyen-Hoang, 2012; Hanushek, 2015; Jackson et al., 2015)

Although it may be intuitive to think about how (and how much) money is spent as a more direct measure of input to student education, it does have its drawbacks. In particular, spending can be allocated irregularly through time. Spending may be high in some years depending on the projects that might need to be at a stage requiring higher expenditures for a certain period.

When we look at the yearly trend of revenue per pupil under the narrow SRSA eligible rural definition and under the broad RLIS eligible rural definition, two definitions provide two very different narratives on gap in funding between rural and non-rural school districts. According to the narrative from the narrow definition in Figure 2.1, it seems that rural school districts receive equivalent levels of funding compared to non-rural school districts. In contrast, the graph under broad rural definition suggests a conflicting story of how rural school districts receive less funding compared to non-rural school districts. The gap also appears to be consistent across the eight years of data.

It is difficult to accurately describe revenues of rural districts. In summary statistics, all the differences in district characteristics can be disguised when summed up to the mean. For example, a remote rural school district in Alabama in the South region would have quite different district characteristics compared to a large rural school district in California in the West region such as racial diversity, poverty level, and the number of students attending. To describe the differences with more nuance, I run regression analyses controlling for observable district characteristics as well as unobserved characteristics with region-by-year or state-by-year fixed effects.

2.5.3 Empirical Design and Methodology for the Regression Analysis

To describe the differences in financing, I use regression analysis.

2.5.3.1 District organization capacity characteristics

To reflect the size of a school district, the number of schools within a district as well as the number of students in the district are included in the analysis. Using both measures allows us to differentiate between districts that centralize (by having a few schools that each serves large student bodies) or decentralize (with more numbers of smaller schools within a district), where decentralized districts need to split resources including revenues across more schools.

2.5.3.2 District demographic/socio-economic characteristics

To measure demographic/socio-economic characteristics that could be related to its resource allocation for a school district, I selected Free and Reduced Lunch eligibility (FRL) (%) and minority students (%). These characteristics are often associated with students from low-income households, and it may be more costly to educate students from low-income households. In addition, education attainment (i.e., college degree or above)

for the population ages 25 and over (%), the unemployment rate for the population age 16 and over (%), and median household income ($1000) are included to gauge the economic health of the district. The economic health of the district could be related to revenue generation from local taxes.

2.5.3.3 District finance characteristics

I included per pupil revenue as an outcome (dependent) variable in this regression. Historically, per-pupil spending is one of the most common outcome variables that is used in educational research. I use per-pupil revenue instead, as revenue represents the funds that are allocated in a particular year, whereas spending could represent funds from different years. Region and State fixed effects

Historically, rural education researchers have focused on certain issues (e.g., teachers, school leadership, etc.) in specific regions or states. Thier et al. (2021) discovered that most rural studies take place in the South and Midwest regions, and there are many regions that are not as extensively studied, leading to a possibly incomplete understanding of the salient issues in rural education. Therefore, using state and region-fixed effects could help to gauge if the differences in the narrow and broad rural definitions may be related (interpreted) to the national context. I would like to see if being rural is associated with total revenue per pupil amount while controlling for regions and states using fixed effect. I will use the region classification from the U.S. Census Bureau designated region information as shown in Table 2.7.

In all model specifications, y_{it} represents per-pupil revenue in district *i* in year *t*. Model 1 is the simplest model that contains an indicator variable that equals '1' if the district is identified as a rural district ($I(Rural_{it})$). In Table 2.8, the narrow rural definition

means SRSA eligible rural and the broad rural definition means RLIS eligible rural. Equation (1) below describes Model 1.

$$y_{it} = \beta_0 + \beta_1 I(Rural_{it}) + \varepsilon_{it} \qquad (1)$$

In Model 2, in addition to the indicator variable, several control variables that describe the district are included as a vector x_{it}. This vector contains the number of schools and students in the district, percentage points of FRL, percentage points of minority students, portion (%) of the population with a bachelor's degree or more, and median income ($1000). Equation (2) below describes Model 2.

$$y_{it} = \beta_0 + \beta_1 I(Rural_{it}) + \beta_2' x_{it} + \varepsilon_{it} \qquad (2)$$

Models 3 and 4 include all of the variables found in Model 2, and also contain geographic and time-fixed effects. In Model 3, the geographic fixed effect is defined by the four Census regions, and in Model 4, it is defined by states. Time fixed effects are annual.

$$y_{it} = \beta_0 + \beta_1 I(Rural_{it}) + \beta_2' x_{it} + \alpha_i + \delta_t + \varepsilon_{it} \qquad (3)$$

2.5.4 Regression Analysis Results

I evaluate whether rural districts have similar levels of financial resources as their non-rural counterparts. From the summary statistics, it appears rural districts do get a comparable level of financial support, a similar level that non-rural districts receive under the narrow rural definition. However, rural districts appears to have lower levels of funding compared to their non-rural counterparts under the broad definition. All regression results are presented in Table 2.8.

Model 1 is the simplest regression from only trying to see if being rural is associated with differential amounts of per-pupil revenue that a school district would get in

comparison to non-rural school districts. The result showed that under the narrow rural definition, the average rural district has a similar amount of per pupil revenue compared to its non-rural counterparts, getting about $267 more in per pupil revenue. Under the broad definition, a rural district would receive $1,260 per pupil revenue less than the average non-rural district. The results are initially the same as the overall summary statistics shown in Tables 2.4 and 2.5 since this model did not control any of the different districts' diverse demographic and socio-economic characteristics.

Model 2 have more independent variables to control for districts' demographic and socio-economic characteristics. Adding these variables allows us to compare rural and non-rural districts that look more like each other, in terms of size, student population, and general economic health. The analysis results using Model 2 reveal that rural districts receive more funding than non-rural districts under both narrow and broad definitions. Under the narrow definition, rural districts receive higher ($1,600) per-pupil revenue than non-rural districts. Under the broad definition, controlling for district characteristics, the sign of Model 1's results flipped confirming rural districts actually have $457 per pupil revenue more than non-rural districts do.

As Model 2 showed that district's characteristics are related to the district per pupil revenue amount, I look for the potential relationship between different rural definitions and the amount of per pupil revenue that a school district receive without investigating a district's external causal factors such as political reasons/context that could influence policymakers developing financial policies for rural districts with additional funding.

In the next two Models, Model 3 and Model 4, I implement an additional control for unobservable time-invariant characteristics of districts common across geography by

including region-fixed effects (Model 3) and state-fixed effects (Model 4). In addition, I include *year* indicators to control for unobserved characteristics that may be common across all geographic regions but vary with time. These two-way fixed effects should control for many unobserved external factors that may nonetheless affect district revenue generation.

Model 3 showed that even higher revenue levels that are correlated with rural status when you control for the regional differences (4 regions from the U.S. Census Bureau defined areas). Under the narrow definition, rural districts receive $2,642 per pupil more than non-rural districts do. Considering the national average per pupil revenue is $15,339, this is about a 17% difference. Under the broad definition, rural districts also have much higher per pupil revenue ($2,255 more) than their non-rural counterparts.

Model 4 results show that rural districts under both definitions would have similar results with Model 3 but a little lower increase in funding while controlling for state-level unobservable characteristics. I do not have data on state-specific education policies that could allocate funding in influential ways. While the fixed effect framework may help to control for some of these impacts, having additional data on such policies may yield a more detailed picture of school district financing.

2.6 Conclusion

In its decision-making in school finance, each level of government (i.e., local, state, and federal) considers various elements reflecting place-specific contexts such as district-specific demographic and socio-economic characteristics in its policy contexts. To establish targeted school finance policies for certain areas or populations. It is important to define what rural means for the research purpose before examining the differences between

rural and non-rural to understand the relevant factors and how they might be related to school finance decision-making process and local school district financial outcomes.

Many studies in rural education have discussed how rural policies have been developed based on existing policies originally designed for urban settings without considering their rural-specific contexts. Understanding the history and current status of rural districts under a clear rural definition may be an important first step for developing rural-specific policies that will benefit rural districts.

Through descriptive summary statistics and regression analysis, this paper shows how we define rural matters in terms of providing a more accurate representation of the funding situation for rural districts. Current rural school district characteristics and its financial circumstances. Applying varying criteria to school districts may switch a district from rural to non-rural, or vice versa. The different groupings may then shift the demographic/socio-economic characteristics, district organizational capacities, and revenue and spending patterns of a 'representative rural' district. The finding from regression analysis supports that different rural definitions are related to the revenue per pupil in rural districts across the regions and states.

As federal rural definitions used in education are connected directly to additional funding opportunities for rural districts, further research is necessary to identify what we mean by a "rural" district, and how to group such districts using easily observable characteristics. Understanding the differences in districts' characteristics, as well as revenue and spending patterns, could also help develop more effective policies aimed at aiding and sustaining rural districts.

2.7 Tables and Figures

Table 2.1 U.S. Census Bureau defined area/locale code classifications and criteria

Area	Locale Codes	Code Name	Descriptions
City	11	City – Large	Territory inside an Urbanized Area and inside a Principal City with a population of 250,000 or more.
	12	City – Midsize	Territory inside an Urbanized Area and inside a Principal City with a population less than 250,000 and greater than or equal to 100,000.
	13	City – Small	Territory inside an Urbanized Area and inside a Principal City with a population less than 100,000.
Suburban	21	Suburban – Large	Territory outside a Principal City and inside an Urbanized Area with a population of 250,000 or more.
	22	Suburban – Midsize	Territory outside a Principal City and inside an Urbanized Area with a population less than 250,000 and greater than or equal to 100,000.
	23	Suburban – Small	Territory outside a Principal City and inside an Urbanized Area with a population less than 100,000.
Town	31	Town – Fringe	Territory inside an Urban Cluster that is less than or equal to 10 miles from an Urbanized Area.
	32	Town: Distant	Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
	33	Town: Remote	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
Rural	41	Rural: Fringe	A census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
	42	Rural: Distant	A census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
	43	Rural: Remote	A census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Data source: NCES Locale Classifications
(https://nces.ed.gov/programs/edge/Geographic/LocaleBoundaries)

Table 2.2 Two different rural definitions used in the U.S. Department of Education

Locale Codes	Code Name	Broad Rural Definition (Eligible for RLIS funding)	Narrow Rural Definition (Eligible for SRSA funding)
32	Town: Distant	O	X
33	Town: Remote	O	
41	Rural: Fringe	O	O
42	Rural: Distant	O	O
43	Rural: Remote	O	O

Data source: NCES REAP program website

Table 2.3 U.S. Census-defined rural and non-rural school districts by locality

Definition	Area	Locale Codes	Number of School Districts	Percentage (%)
Non-Rural	City	11	1,197	1.1
		12	1,254	1.2
		13	3,143	3.0
	Suburban	21	19,515	18.6
		22	2,575	2.5
		23	1,823	1.7
	Town	31	3,765	3.6
		32	9,066	8.6
		33	6,207	5.9
Rural	Rural	41	13,650	13.0
		42	24,943	23.8
		43	17,887	17.0
Total			105,025	100.0

Data source: NCES, SEDA, U.S. Department of Education. 2010-2018.

Table 2.4 Rural vs. Non-rural using the narrow rural (SRSA) definition

Variable	Rural			Non-Rural		
	Mean	Median	SD	Mean	Median	SD
District Capacity variables						
Number of schools within a district	3.6	3.0	3.91	10.7	6.0	21.76
Number of students (1000)	1.210	0.558	2.46	6.151	2.722	14.89
Number of full-time teachers (1000)	0.080	0.041	0.15	0.367	0.166	0.87
Number of resources staff (1000)	0.010	0.004	0.03	0.045	0.015	0.13
Number of admin. staff (1000)	0.057	0.025	0.11	0.248	0.107	0.61
District Demographic/SES variables						
Free and Reduced Lunch (%)	0.51	0.50	0.20	0.47	0.47	0.24
Poverty rate (%)	0.19	0.17	0.09	0.17	0.16	0.10
Minority*(%)	0.17	0.07	0.22	0.30	0.18	0.28
Education attainment† (%)	0.19	0.17	0.09	0.28	0.23	0.16
Unemployment rate$^{\phi}$ (%)	0.07	0.07	0.02	0.08	0.07	0.03
Median house income ($1000)	54.063	51.646	15.16	63.888	56.988	26.18
District Finance variables						
Revenue per pupil ($1000)						
Total revenue	15.462	13.395	8.66	15.195	13.407	6.58
Federal revenue	1.229	1.015	1.23	1.067	0.902	0.77
State revenue	7.120	6.485	4.38	6.375	6.013	3.06
Local revenue	7.113	5.349	7.57	7.754	5.812	6.62
Title I revenue	0.306	0.233	0.50	0.263	0.201	0.27
State formula assistance revenue	5.266	4.996	3.29	4.384	4.398	2.54
Spending per pupil ($1000)						
Total spending	15.288	12.973	9.12	15.096	13.227	6.70
Instructional spending	7.580	6.699	3.42	7.763	6.783	3.14
Transportation spending	0.715	0.591	0.60	0.545	0.458	0.55
Observations (n=105,025)			56,480			48,545

** Minority=Hispanic, Black, Native American students.*

† Bachelor's Degree or higher for the population 25 and older.

$^{\phi}$ for the population 16 and older.

Data source: NCES, SEDA, U.S. Department of Education. 2010-2018.

Table 2.5 Rural vs. Non-rural using the broad (RLIS) definition

Variable	Rural			Non-Rural		
	Mean	Median	SD	Mean	Median	SD
District Capacity variables						
Number of schools within a district	4.0	3.0	4.02	13.0	6.0	25.83
Number of students (1000)	1.454	0.750	2.42	7.892	3.515	17.67
Number of full-time teachers (1000)	0.095	0.052	0.15	0.467	0.215	1.03
Number of resources staff (1000)	0.012	0.005	0.03	0.057	0.019	0.15
Number of admin. staff (1000)	0.067	0.033	0.11	0.315	0.133	0.73
District Demographic/SES variables						
Free and Reduced Lunch (%)	0.52	0.51	0.20	0.42	0.40	0.26
Poverty rate (%)	0.19	0.18	0.09	0.15	0.13	0.10
Minority*(%)	0.19	0.08	0.23	0.31	0.19	0.29
Education attainment† (%)	0.19	0.17	0.08	0.32	0.29	0.16
Unemployment rate$^{\phi}$ (%)	0.07	0.07	0.03	0.08	0.07	0.03
Median house income ($1000)	52.754	50.472	14.57	71.218	65.458	27.83
District Finance variables						
Revenue per pupil ($1000)						
Total revenue	14.940	13.052	7.99	16.200	14.493	7.21
Federal revenue	1.239	1.043	1.13	0.971	0.780	0.79
State revenue	7.001	6.431	4.08	6.289	5.868	3.23
Local revenue	6.699	5.095	7.00	8.940	7.042	7.24
Title I revenue	0.312	0.244	0.46	0.230	0.154	0.27
State formula assistance revenue	5.202	4.969	3.07	4.118	4.082	2.70
Spending per pupil ($1000)						
Total spending	14.798	12.678	8.41	16.065	14.392	7.27
Instructional spending	7.384	6.580	3.19	8.270	7.266	3.43
Transportation spending	0.663	0.546	0.55	0.579	0.484	0.63
Observations (n=105,025)			71,753			33,272

** Minority=Hispanic, Black, Native American students.*

† Bachelor's Degree or higher for the population 25 and older.

$^{\phi}$ for the population 16 and older.

Data source: NCES, SEDA, U.S. Department of Education. 2010-2018.

Table 2.6 Locality district characteristics (mean) under the broad rural definition

Variables	Town: Distant	Town: Remote	Rural: Fringe	Rural: Distant	Rural: Remote
	32	33	41	42	43
District Capacity variables					
Number of schools within a district	5.8	5.8	5.4	3.3	2.6
Number of students (1000)	2.475	2.183	2.661	0.968	0.440
Number of full-time teachers (1000)	0.153	0.140	0.168	0.066	0.034
Number of resource staff (1000)	0.020	0.018	0.020	0.008	0.004
Number of admin. staff (1000)	0.110	0.093	0.118	0.048	0.023
District Demographic/SES variables					
Free and Reduced Lunch (%)	0.55	0.59	0.45	0.51	0.55
Poverty rate (%)	0.21	0.23	0.17	0.18	0.21
Minority*(%)	0.25	0.31	0.20	0.15	0.18
Education attainment† (%)	0.18	0.19	0.23	0.18	0.18
Unemployment rate$^{\phi}$ (%)	0.08	0.07	0.07	0.07	0.06
Median house income ($1000)	49.351	45.812	62.115	54.137	47.798
District Finance variables					
Revenue per pupil ($1000)					
Total revenue	13.188	12.746	14.617	14.647	17.243
Federal revenue	1.214	1.364	1.029	1.171	1.463
State revenue	6.715	6.342	6.574	7.122	7.533
Local revenue	5.259	5.039	7.014	6.355	8.247
Title I revenue	0.312	0.364	0.241	0.289	0.378
State formula assistance revenue	5.026	4.870	4.705	5.351	5.576
Spending per pupil ($1000)					
Total spending	13.137	12.766	14.367	14.461	17.145
Instructional spending	6.756	6.518	7.303	7.261	8.235
Transportation spending	0.498	0.432	0.655	0.685	0.803
Observation (n=71,753)	9,066	6,207	13,650	24,943	17,887

** Minority=Hispanic, Black, Native American students.*

† *Bachelor's Degree or higher for 25 and older.*

$^{\phi}$ *for the population 16 and older*

Data source: NCES, SEDA, U.S. Department of Education. 2010-2018.

Table 2.7 U.S. Census-defined regions and divisions

Region		Division		N	Percentage (%)
1	Northeast	1	New England	5,524	5.3
		2	Middle Atlantic	14,922	14.2
2	Midwest	3	East North Central	23,224	22.1
		4	West North Central	17,490	16.7
3	South	5	South Atlantic	5,881	5.6
		6	East South Central	5,177	4.9
		7	West South Central	14,436	13.8
4	West	8	Mountain	7,401	7.1
		9	Pacific	10,970	10.5
Total				105,025	100.0

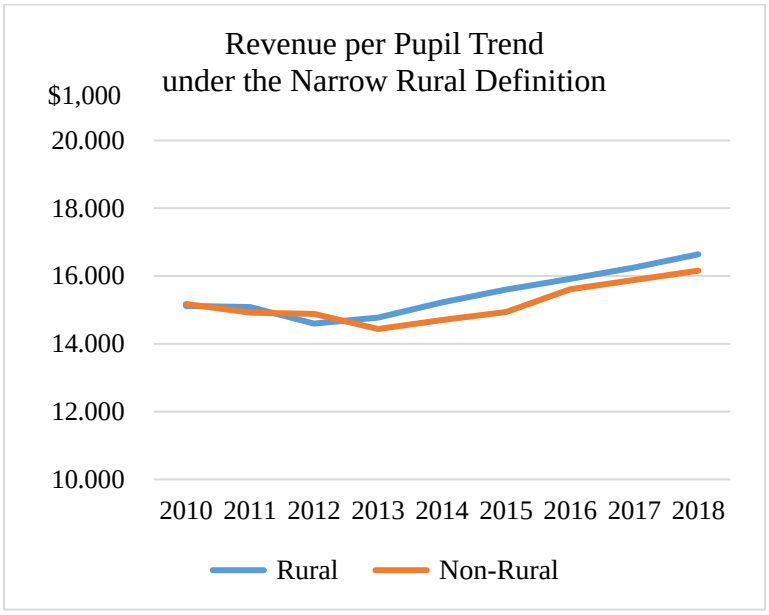
Data source: U.S. Census Bureau

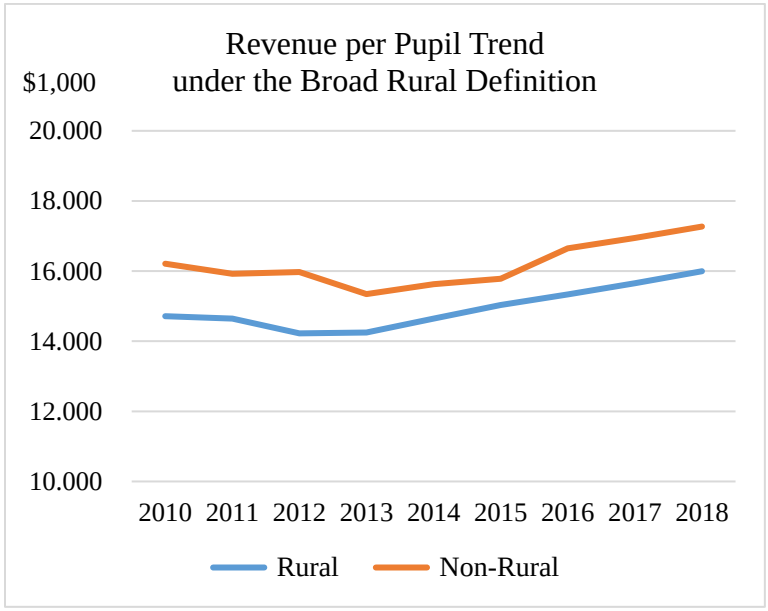
Table 2.8 Regression results (with region and state fixed effect)

	Narrow Rural Definition				Broad Rural Definition			
	Total Revenue per Pupil ($1000)				Total Revenue per Pupil ($1000)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Being Rural	0.267*** (0.048)	1.584*** (0.052)	2.642*** (0.049)	2.511*** (0.048)	-1.260*** (0.051)	0.457*** (0.061)	2.255*** (0.058)	1.780*** (0.058)
District Characteristics								
Number of Schools within a District		0.0004 (0.006)	0.032*** (0.005)	0.015*** (2.900)		-0.004 (0.006)	0.027*** (0.005)	0.012** (0.005)
Number of Students (1000)		-0.076*** (8.840)	-0.090*** (0.008)	-0.066*** (0.008)		-0.076*** (0.009)	-0.082*** (0.008)	-0.061*** (0.008)
FRL Eligibility (%)		-1.055*** (0.192)	0.472*** (0.179)	2.892*** (0.180)		-0.902*** (0.193)	0.592*** (0.180)	3.041*** (0.181)
Minority Student (%)		2.342*** (0.122)	3.901*** (0.118)	2.756*** (0.127)		1.685*** (0.123)	3.517*** (0.119)	2.090*** (0.129)
Education Attainment (%)		13.240*** (0.303)	10.271*** (0.286)	13.351*** (0.280)		11.680*** (0.305)	9.341*** (0.288)	12.007*** (0.283)
Median Income ($1000)		0.021*** (0.002)	0.001 (0.002)	-0.014*** (0.002)		0.024*** (0.002)	0.011*** (0.002)	-0.005*** (0.002)
Observations	104,810	104,810	104,810	104,810	104,810	104,810	104,810	104,810
Region-by-year Fixed Effects	No	No	Yes	No	No	No	Yes	No
State-by-year Fixed Effects	No	No	No	Yes	No	No	No	Yes

* p<0.10; ** p<0.05, *** p<0.01. Robust standard errors are in parentheses.

Figure 2.1 Historical trend of revenue per pupil under two rural definitions





CHAPTER 3. DIVERSITY WITHIN RURAL SCHOOL DISTRICTS: A CLOSER LOOK AT RURAL EDUCATION ACHIEVEMENT PROGRAM AND ITS POLICY CHANGES

3.1 Introduction

Rural school districts in the U.S. are historically perceived to be poorer, suffer from a lack of resources, and have lower level of academic outcomes across a myriad of measurable characteristics compared to non-rural school districts. Some researchers have studied the effect of different state and federal rural school policies on teachers, students, and school finance (Combs, Foster, and Toma, 2019; Bruno and Dhaliwal, 2017, 2021; Gagnon and Mattingly, 2015). Others highlighted the fact that current rural policies seem to be crafted without knowledge of the needs of rural districts (Johnson and Howley, 2015; Yettick et al., 2014). Many researchers have focused on how the rural contexts are unique in terms of teachers (Glover et al., 2016; Barrett, Cowen, and Toma, 2015; Fowles et al., 2013), populations and their financial situations (Combs, Foster, and Toma, 2019; Dupere et al., 2019; Schmitt-Wilson, Downey, and Beck, 2018; Prins and Kassab, 2017; Jordan, Kostandini, and Mykerezi, 2012; Stair, Rephann, and Heberling, 2006).

Congress instituted the Rural Education Achievement Program (REAP) in 2002 with bi-partisan efforts (Collins, 2003). The legislation provides supplementary federal funding to rural school districts in a systemic, reliable way.

In this paper, I will examine the REAP initiative and its recent policy changes. First, I will explain what REAP and its two sub-programs are (Rural and Low-Income School Program (RLIS) and Small, Rural School Achievement (SRSA) program). Second, I analyze REAP program policy, specifically, its new rural eligibility definition and newly introduced dual-eligibility provision. These changes were implemented in 2017, and I

compare what differences are observed before and after the policy changes and how the rule changes are associated with the REAP funding allocation among REAP recipients.

3.2 What is REAP?

REAP is a federal funding initiative designed to help rural school districts. There are two programs under the REAP initiative: Rural and Low-Income School Program (RLIS) and Small, Rural School Achievement Program (SRSA). RLIS is developed for rural school districts with a socio-economically disadvantaged population of children from families with incomes below the poverty line. SRSA does not take into account a district's poverty status, but it is established for small, rural school districts to assist them with more resources that they could lack due to their size. A qualified school district can only apply for one program and cannot receive funding from both programs even if it has met the requirements for both. In other words, they are mutually exclusive when receiving the funding.

Comparing RLIS and SRSA program eligibilities, there is a critical difference in their rural eligibility. Even though RLIS and SRSA are under the same REAP initiative, they have different definitions of being 'rural.' As described in Table 3.1., RLIS defines the designated rural areas more broadly compared to SRSA using locale codes adapted from the U.S. Census Bureau. (See Appendix 2.1.) This difference in 'defining rural' may influence the way researchers and the general public view rural school districts. The differences in summary statistics that arise from the different definitions could shape the public and policymakers' perception on how rural districts look like.

3.3 Why does REAP policy matter?

REAP policy is a critical financial support for rural districts as it is an annual, systemic grant program.

The REAP grant is a relatively small amount of funding compared to other federal/state funding amounts such as Title I funding. Although the amount of funding may appear to be relatively modest, in the poor, small rural districts examined in this paper, even these small amounts can be used to purchase new textbooks or have professional development for teachers. REAP funding is a modest portion (about 0.3%) of the total instructional spending of REAP recipient districts, but the additional benefits may still be important for improving the quality of education in rural school districts.

The REAP program has bipartisan support (Collins, 2003). The importance of these funds is demonstrated by the vigorous response by politicians when proposed rule changes threatened some districts' funding. For example, when the U.S. Department of Education (ED) attempted to change the definition of poverty required for one of REAP initiatives, there was a joint effort to oppose this shift. In early 2020, ED announced that it would change its poverty eligibility requirements for the RLIS. The newly suggested policy change would not allow school districts to use 'Free and Reduced Lunch (FRL) program eligibility' as an alternative measure of poverty status. Instead, they required rural school districts to abide by the existing law, using the Small Area Income and Poverty Estimates (SAIPE) data from the U.S. Census Bureau as a sole school poverty measure (Green, 2020).

If instituted, this new rule would have resulted in many rural school districts losing their RLIS funding. Because SAIPE estimates do not include isolated rural schools in its data collection, some rural school districts had been substituting the eligibility for FRL to

qualify for RLIS funding instead of SAIPE data. If the federal government mandated SAIPE estimate as the only accepted poverty measure for RLIS funding, these remote rural schools may have had to use their neighboring school's poverty data, which may no longer be reflective of their true poverty status.

In response, twenty-one senators signed a bipartisan letter to ED urging it to abandon the plan for the change as this change in the definition of poverty could force many rural districts to shut down essential programs (see Appendix 2.2 for more details). ED withdrew its decision to implement the rule less than a week after the initial announcement (Green, 2020). This demonstrates how important this modest amount of funding was for rural districts. , as well as how different definitions could alter the status quo of rural school districts and most importantly, how this rule change influences whether rural school districts could receive additional funding to maintain or improve their educational services.

3.4 Data and Methodology

3.4.1 Data

I built a school district-level, a national dataset for four consecutive fiscal years (FY) from 2015 to 2018 assembling the data from four diverse sources. First, district-level demographic and socio-economic data is from the Common Core Database (CCD) on the National Center for Education Statistics (NCES) and the Stanford Education Data Archive (SEDA). Second, school district finance data are from the Local Education Agency (School District) Finance Survey (F33) Data from CCD Rural Education Achievement Program (REAP) eligibility, and funding formula data from ED, Office of Elementary & Secondary Education. Additionally, district-level REAP funding data was collected from each State Department of Education to identify the details of its eligibility and the amount of funding

that each district receives. Special school districts (e.g., school districts for the visually impaired, youth correctional facilities, etc.), American Indian (AI) districts, and school districts in Alaska and Hawaii are excluded. The final dataset contains 12,101 unique regular school districts.[4]

Due to the limited public access to this district-level REAP funding allocation amount data for each state, only FY 2017 and FY 2018 data are used for this paper. Within the publicly available federal REAP data and documentation from ED, a report from the Congressional Research Service (CRS) titled "The Rural Education Achievement Program: Title V-B of the Elementary and Secondary Education Act" written in 2017, explains the details of how grant amounts are determined. It reveals that RLIS funds are distributed based on Average Daily Attendance (ADA). In addition, ADA is also an element in the calculation of funding amount in the SRSA formula.[5]

To confirm the RLIS formula, I contacted the Program Officer on the REAP team at ED, Office of Elementary and Secondary Education, asking what elements are considered in the REAP funding decision-making as well as in the RLIS grant formula. The REAP program officer confirmed that both RLIS and SRSA are formula grant programs, and ED calculates a state-level RLIS grant allocation using the statutory funding formula described in section 5221(a)(2) of the ESEA. The amount of funding each state receives is based on its proportionate share of children in ADA in all RLIS-eligible school districts, excluding dual-eligible school districts that select SRSA. A noteworthy fact is the

[4] The dataset includes 45,288 regular school districts-year observations and represents 12,101 unique regular school districts.

[5] The formula for calculating a district SRSA grant allocation is:
• Initial Amount = [ADA– 50]*100 + $20,000 or If ADA ≤ 50, then initial amount = $20,000
• Initial amount is capped at $60,000
• Allocation = Initial amount – [a preceding year's Title II-A + Title IV-A allocations]

ED comes up with how much to give per pupil through the funding formula, but ED does not distinguish how high the poverty rate is for each district. In other words, ED did not consider whether a district has a 21% poverty rate or a 50% poverty rate in its funding decision. Based on the actual funding amounts awarded, I find there is no different treatment of districts with varying levels of poverty, as long as they meet the 20% threshold.

However, RLIS-eligible school districts do not receive their grant funds directly from ED. ED awards funds to each state educational agencies administering the RLIS program, which in turn award subgrants to eligible rural school districts. Unfortunately, some state education departments do not provide public access to the district-level allocation data, so I extrapolated the funding amounts for school districts in those states based on the funding formula available in ED documents.

Congress approves designated amounts for RLIS funding each year, and ED divides the total amount of approved funding by the total ADA of the districts in the U.S. that are eligible and have applied for RLIS funding. Then the funding is given to state governments and each state distributes the funding to a local school district based on its ADA.[6]

3.4.2 Methodology

While I focused on comparing the mean of each variable, I acknowledge that variance is also critical to determine whether the differences are meaningful. I am aware of the importance of accounting for the distribution, so to take that into consideration, I use

[6] The total amount of RLIS funding a district receives is calculated as follows: Total amount of RLIS funding equals per-pupil RLIS funding multiplied by the ADA of a district. For example, the RLIS funding per pupil (district level) for all states was $23 in 2017. In 2017, Adair, KY district's ADA was 2,389. The RLIS funding estimated amount is then $23 x 2,389 = $54,947. The actual reported RLIS funding amount was $55,031, so the estimated amount is 99.9% of the reported amount. According to the reported data, the per-pupil funding amount in 2017 was $23.04 in Kentucky, which is a very small deviation from the estimation.

Kolmogorov–Smirnov (K-S) test to formally estimate the densities by comparing two sample distributions to each other. I chose the K-S test as it can identify patterns that cannot be distinguished from a Student's t-test by detecting the variance when the sample mean, and standard deviation are similar. A similar methodology was utilized by Bacolod et al. (2021) examining sorting and agglomeration effects among young college graduates.

3.5 What are the recent changes in the REAP policy?

There were two REAP funding eligibility policy changes implemented in 2017 that affected rural district funding decisions. The changes in school district funding allocation began in 2018. First, there was a change in locale codes used for rural eligibility as shown in Table 3.2. ED adopted new locale codes created by the U.S. Census Bureau for their grant programs. The new locale codes were used as the new rural eligibility requirement applying for REAP funding. In other words, the federal definitions of rural were changed. The new locale codes are based on a district's proximity to an urbanized area (UA[7]) while old codes were based on the vicinity of metropolitan statistical areas (MSA[8]) or consolidated metropolitan statistical areas (CMSA[9]). Table 3.2 summarizes these changes.

I gathered documentation from NCES to find their stated reason for the change in locale codes. A document from NCES states that the change was implemented due to better data collection methodology improvement in geocoding technology that is developed in 2015. A notable fact is that only locale code eligibility has changed, and the RLIS-eligible poverty threshold remains the same at 20% as well as the SRSA-eligible district population

[7] UA: An urban area consists of 50,000 or more people.
[8] MSA: A metropolitan area consists of one or more counties that contain a city of 50,000 or more populations or contain a UA
[9] CMSA: An area that meets the requirements to qualify as an MSA and also has a population of one million or more.

size requirement being a district serving fewer than 600 students or a population density of 10 persons per square mile.

Second, when the Every Student Succeeds Act (ESSA) was signed by President Obama in 2015, and Congress added a new ‘choice of participation’ provision to the REAP statute to allow rural school districts to choose their preferred program when they qualified for both RLIS and SRSA. This new 'dual-eligibility' policy provides flexibility for rural districts to make their own financial decision in REAP funding process. Prior to 2017, rural school districts meeting eligibility requirements for both programs had no choice but to participate in SRSA. With the new dual eligibility provision in place starting in 2018, local school districts are given an opportunity to choose RLIS or SRSA based on their preference. In other words, it allows small, poor rural districts to choose the program that would give more funding to them. If a district chooses to participate in SRSA but the calculated funding amount from the SRSA funding formula results in $0, the district will be automatically enrolled to receive RLIS funding. Table 3.3 summarizes the dual-eligibility criteria.

RLIS funding is designed to help poor rural school districts (that is, the poverty rate is equal to or higher than 20%). Changing the locale code definition broadens (in this case) the definition of rural districts, allowing several hundred poor, newly-defined-as-rural districts to receive additional funding. While this is beneficial for the new recipient districts, this turns out to be a disadvantage for the districts that were originally receiving RLIS funds, because the size of the "pot of money" remains the same as the prior year before the policy change.

SRSA policy, on the other hand, is designed for small (i.e., ADA<600) rural school districts. The focus is not on poverty. Less than 40% of SRSA-eligible districts have poverty rates at or above 20%. Some poor districts are also small in size (these are 'dual-eligible' districts) and starting in 2017, the new dual-eligibility provision allows these small, poor rural districts to have a choice to apply for RLIS or SRSA funding.

3.6 Analysis

I analyzed how REAP eligibility policy changes bring distribution changes in REAP funding allocation as well as the observed changes in rural school district's-demographic characteristics.

3.6.1 The effects of the new rural eligibility policy

As Figure 3.1 shows, under the new rural eligibility established by new locale codes (2017 and 2018), the number of school districts classified as 'RLIS eligible rural' increased by 5% compared to the old rural eligibility era (2015 and 2016) while the numbers of school districts that are categorized as 'SRSA eligible rural' decreased slightly (2%). As the poverty requirement for RLIS and the small ADA requirement for SRSA were not changed, this result reflects new local codes changing the scope of the areas being defined as rural.

Table 3.4 shows that the socio-demographic characteristics of RLIS rural eligible school districts are very similar under the old and new rural definitions while SRSA rural eligible school districts under the new definition have smaller ADA with a less diverse student population compared to the ones under the old definition. Comparing the per pupil total revenue of both RLIS and SRSA rural eligible districts, the average amount is increased by 4-5% under the new definitions. Considering per pupil revenue has increased about 2-3% every year in the past, this is a modest but not insubstantial increase in real

terms. Their financial sustainability represented by local revenue raising capacity (the portion of local revenue generated among the total revenue) stays at the same level (46-47%) for both RLIS and SRSA rural eligible districts.

Overall, town localities (Census locale codes 32, 33) are quite different from rural localities (Census locale codes 41, 42, 43) in demographics and financial capacity. In distant and remote town localities, their districts are larger in size with more schools and more students, but their per pupil revenue and local revenue-raising capacity are much lower than in rural localities. A higher the percentage of local revenue-raising capacity may be indicative of more local financial independence and stability.

Table 3.5 summarizes the differences and similarities across districts with different Census locale codes. Among all the localities, 'Remote Town' has the lowest total revenue per pupil, 27% lower than the highest total revenue per pupil for 'Remote Rural' while 'Remote Rural' has less than 20% of the total number of students in 'Remote Town.' Despite its small size, 'Remote Rural' is the most affluent locality being financially capable of generating about half of its total revenue.

As Table 3.6 shows, SRSA rural eligible school districts mostly belong to Distant Rural (42) and Remote Rural (43) localities. Remote Rural (43) has a much smaller ADA than Rural Fringe (41) and Distant Rural (42). Rural Fringe (41) and Remote Rural (43) are financially more affluent compared to Distant Rural (42) considering their per pupil total revenue and local revenue generating capability, even though the poverty rate for Remote Rural is higher than Distant Rural.

Congress approved the amounts of funds available for REAP on an annual basis. Under section 5234 of the Elementary and Secondary Education Act (ESEA), the funds are

distributed equally between the SRSA and RLIS grant programs. In other words, both programs receive the same total amount of funding as shown in Figure 3.2.

In 2018, the first year of new dual-eligibility districts receiving their choice of REAP funding as shown in Figure 3.3, 17% of all dual-eligible school districts chose to participate in the RLIS program while most of the dual-eligible districts chose to receive the SRSA grant. As the total REAP funding amount in 2017 and 2018 stayed the same (see Figure 3.2), the newly added number of districts participating in the RLIS program in 2018 led to less average funding amount for each school district participating in the RLIS.

Under the new dual-eligibility policy, the dual-eligible districts show the increases in their per-pupil total revenue. As summarized in Table 3.7, the districts that chose RLIS have higher Title II Part A funding. The SRSA grant amount for a district is finalized by the formula that subtracts Title II Part A funding amount at the end of the calculation before finalizing the total grant awarded, this formula may have made the districts with higher Title II Part A funding participated in the RLIS program.

On average, RLIS recipient districts in 2018 have a smaller number of students than the ones in 2017. The dual eligibility policy contributes to this change as 245 districts among 1,446 dual-eligible districts chose to receive the RLIS grant over the SRSA grant in 2018. Other demographic characteristics of the recipients such as the size of the district (i.e., measured by the number of schools within a district), poverty rate, and racial diversity have not changed substantively from 2017 to 2018.

3.6.2 The new policy changes on the REAP recipient districts

The number of RLIS recipient districts increased significantly by 24% while the average amount of RLIS grants decreased considerably by 25%. As the total amount of

RLIS funding is unchanged for 2017 and 2018 ($87,920,000), the funding amount for each district shrank due to the increased number of RLIS recipients. The average total revenue per pupil of RLIS recipient districts in 2018 has increased by 8% compared to the average total revenue of the RLIS recipients in 2017. Considering the average inflation rate of 2.25% between July 2017 and July 2018, the average RLIS recipient districts in 2018 are modestly more affluent than the RLIS recipients in 2017 based on their total per pupil revenue. Table 3.8 summarizes these changes across time.

As shown in Table 3.9, SRSA 2018 recipients have lower poverty and smaller minority population than 2017 recipients while ADA stays at the same level. The per pupil total revenue of 2018 SRSA recipients has slightly increased by 6% compared to the per pupil total revenue of 2017 recipients. The number of SRSA recipients slightly decreased in 2018. One potential explanation is that some dual-eligible districts chose to receive the RLIS grant instead of the SRSA funding as described in Table 3.7.

As Table 3.10 shows, the districts that lost the RLIS funding in 2018 due to the new rural eligibility rules are larger in size, have lower total revenue per pupil, and have a higher minority student population than 2017 RLIS recipients while showing a similar level of the poverty rate. The districts that are newly qualified for RLIS funding in 2018 benefiting from the new locale code changes received higher RLIS grant amounts on average than 2017 recipients as they have much higher ADA that affects the RLIS amount calculation in the formula. The new recipients also have higher per-pupil total revenue than the 2017 recipients while their poverty rate is nearly the same as the 2017 recipients.

The districts that lost the SRSA funding due to the new rural eligibility are much larger in size, have lower per pupil total revenue, more minority population, and higher

poverty rate than the average 2017 RLIS recipients. The new 2018 SRSA recipients following the new locale code changes also have higher ADA and much lower per-pupil total revenue than the 2017 SRSA recipients. However, they have a lower proportion of minority students, and a higher percentage of local revenue raised compared to the 2017 SRSA recipients and the ones that lost SRSA funding in 2018. 55% of the districts that lost SRSA funding in 2018 received RLIS funding instead as they met the RLIS poverty requirement (see Table 3.11).

After comparing all the summary statistics tables above, I investigate further to see if the new changes in district demographic characteristics and financial capacity show any statistically significant differences in their distributions. I utilize K-S tests to estimate whether two distributions (i.e., RLIS 2017 recipients vs. RLIS 2018 recipients) have statistically significant differences.

When comparing RLIS 2017 recipients and RLIS 2018 recipients on their demographics, the K-S test results show that the two distributions on districts' ADA have a statistically significant difference as shown in Figure 3.4. The value in 'Difference' in the 'Combined K-S' category indicates the difference between two group distributions. The p-value for the 'Combined K-S' shows whether the difference is statistically significant or not. In this case, the p-value is 0.000, therefore, the RLIS 2017 recipient group and RLIS 2018 recipient group distributions have a statistically significant difference regarding the ADA of a district (See Appendix 2.3 for more details of how to interpret the K-S test results). On the other hand, there is no statistically significant difference in terms of the poverty rate and the percentage of minority students (see Appendix 2.4 for more details).

Considering the distributions of district finance (total revenue per pupil, RLIS funding amount, and local revenue-raising capacity), they all have turned out to show statistically significant differences from each other after the REAP policy changes as shown in Figures 3.5-3.7. The new policy allocates lower levels of funds to RLIS recipient districts due to the increased number of RLIS recipients in 2018. It increases number of poor rural recipient districts, but the decreased funding amount per district could bring some challenges to rural schools to improve the quality of their curriculum and student learning environment.

Comparing 2017 SRSA and 2018 SRSA recipients, the average ADA and the average SRSA funding amount distributions are very similar with no statistically significant difference shown by the K-S test (see Appendix 2.4 for details of the graphs). It seems that the new policy changes continue to maintain small rural districts to have the same level of financial support through the SRSA grant compared to the old policy. However, as shown in Figures 3.8-3.11, 2018 SRSA recipient distributions show statistically significant differences from 2017 SRSA recipients. 2018 SRSA Recipient districts look more affluent with lower poverty, lower proportion of minority students, higher per-pupil total revenue, and being financially more capable of raising their own local revenue compared to 2017 SRSA recipients.

Both the new rural eligibility and new dual-eligibility policy changes made more rural districts shift to receive the RLIS grant. SRSA recipient districts are small, but relatively more affluent compared to the ones in the old policy era. More years of data and further investigation will be needed to determine the effect of the new policy changes on the SRSA grant.

3.7 Conclusion

New REAP policy changes increased the number of poor rural districts receiving the federal funding through the RLIS grant, but the decreased average RLIS funding amount per district as the total approved REAP funding amount remains the same. The new dual-eligibility provision allows dual-eligible districts the option of participating in RLIS which led some districts to receive a higher amount of funding than they would have received from SRSA participation.

It must be acknowledged that REAP funding is a modest amount, so this program is not going to increase rural district revenue substantially. However, it is still on the order of a few tens of thousands of dollars. There are ways that districts can use the funds to make schools better places without investing in expensive outlays like hiring additional teachers and building extra classroom buildings. For example, school districts might choose to invest in professional development programs, or to invest in newer and better textbooks, or they might choose to increase student support staff which is cheaper than hiring full-time teachers.

Given that REAP funding is small amount, it is important to find out what types of education expenditures could have the best-bang-for-buck by conducting additional research. One could look at the literature to look for prior studies that examine cost-effective education investments. With my dataset, augmented with more data available in the future, one could examine which districts experience largest gains in student outcomes and dig into those districts by collecting more detailed data. We could conduct a survey or use qualitative methodologies, such as conducting interviews or focus groups to see where and how they utilized funding to generate positive gains. Further studies with more years of data under

the new policy are needed to determine how we could provide effective financial support to rural districts while still allowing autonomous financial decision-making at a local district level.

3.8 Tables and Figures

Table 3.1 RLIS and SRSA program eligibility

	RLIS	SRSA
Rural Eligibility	All schools within the district must have a locale code of 32, 33, 41, 42, or 43.	All schools within the district must have a locale code of 41, 42, or 43.
Low Income Eligibility	20% or more of the children ages 5 to 17 served by the district must be from families with incomes below the poverty line.	Not Required
Small Size Eligibility	Not Required	A district must have a total average daily attendance (ADA) of fewer than 600 students or exclusively serve schools that are in counties with a population density of fewer than 10 persons per square mile.
Funding Limits	No Limits	The maximum amount of funds a district may receive is $60,000.

Data Source: U.S. Department of Education, Office of Elementary & Secondary Education website. 2019

Table 3.2 REAP locale code requirement before and after the policy change

Locality	Before the Change			After the Change		
	Code	Name	Descriptions	Code	Name	Descriptions
Town	6	Small Town	An incorporated place or Census-designated place with a population less than 25,000 and greater than or equal to 2,500 and located outside a CMSA or MSA.	32	Town: Distant	Territory inside an urban cluster (UC[10]) that is more than 10 miles and less than or equal to 35 miles from an urbanized area (UA).
				33	Town: Remote	Territory inside a UC that is more than 35 miles from a UA.
Rural	7	Rural, Outside MSA	Any territory designated as rural by the Census Bureau outside a CMSA or MSA of a Large or Mid-size City.	41	Rural: Fringe	A census-defined rural territory that is less than or equal to 5 miles from a UA, as well as rural territory that is less than or equal to 2.5 miles from a UC.
	8	Rural, Inside MSA	Any territory designated as rural by the Census Bureau within a CMSA or MSA of a Large or Mid-size City.	42	Rural: Distant	A census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from a UA, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from a UC.
				43	Rural: Remote	A census-defined rural territory that is more than 25 miles from a UA and also more than 10 miles from a UC.

Data Source: National Center for Education Statistics (NCES) Education Demographic and Geographic Estimates (EDGE) program website, 2019.

[10] UC: An urban cluster that has at least 2,500 and less than 50,000 people.

Table 3.3 The criteria for RLIS, SRSA, and Dual-Eligible districts

	RLIS	SRSA	Dual-Eligible
Rural Eligibility	All schools within the district must have a locale code of 32, 33, 41, 42, or 43.	All schools within the district must have a locale code of 41, 42, or 43.	All schools within the district must have a locale code of 41, 42, or 43.
Low-Income Eligibility	20% or more of the children ages 5 to 17 served by the district must be from families with incomes below the poverty line.	Not Required	20% or more of the children ages 5 to 17 served by the district must be from families with incomes below the poverty line.
Small Size Eligibility	Not Required	A district must have a total average daily attendance (ADA) of fewer than 600 students or exclusively serve schools that are in counties with a population density of fewer than 10 persons per square mile.	A district must have a total average daily attendance (ADA) of fewer than 600 students or exclusively serve schools that are in counties with a population density of fewer than 10 persons per square mile.
Funding Limits	No Limits	The maximum amount of funds a district may receive is $60,000.	Following the funding limit of their choice of the program.

Data source: U.S. Department of Education, Office of Elementary & Secondary Education website. 2019

Table 3.4 REAP rural eligible district characteristics before & after the rural eligibility change

Variables	RLIS Old	RLIS New	SRSA Old	SRSA New
Number of Schools	3.5	3.5	3.0	2.7
ADA	1,036	1,064	767	678
Poverty Rate (%)	20.9	20.3	20.0	19.2
Minority (%)	19.8	19.3	18.7	16.5
Total Revenue Per Pupil ($1000)	15.380	15.957	15.977	16.832
Federal Revenue Per Pupil ($1000)	1.094	1.105	1.075	1.080
State Revenue Per Pupil ($1000)	7.217	7.545	7.351	7.805
Local Revenue Per Pupil ($1000)	7.069	7.307	7.552	7.947
Local Revenue Raising Effort (%)	46.0	45.8	47.3	47.2
Total Spending Per Pupil ($1000)	15.259	15.733	15.840	16.559
Instructional Spending Per Pupil ($1000)	7.501	7.786	7.712	8.130
Observations	14,133	14,875	11,704	11,419

Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2015-2018

Table 3.5 RLIS rural eligible district characteristics under the new rural eligibility by locale codes

Variables	Census Locale Codes				
	Town: Distant	Town: Remote	Rural: Fringe	Rural: Distant	Rural: Remote
	32	33	41	42	43
Number of Schools	5.4	5.5	3.6	2.9	2.5
ADA	2,150	1,987	1,368	796	385
Poverty Rate (%)	21.8	23.8	18.8	19.1	21.2
Minority (%)	25.8	31.3	19.6	15.4	17.6
District Revenue & Spending (per pupil. $1000)					
Total Revenue	13.683	13.118	16.318	15.650	18.077
Federal Revenue	1.100	1.187	0.957	1.037	1.281
State Revenue	7.146	6.683	7.323	7.545	8.121
Local Revenue	5.437	5.248	8.039	7.067	8.675
Local Revenue Raising Effort (%)	39.7	40.0	49.3	45.2	48.0
Total Spending	13.756	13.138	15.851	15.348	17.876
Instructional Spending	6.987	6.641	7.969	7.652	8.563
Observations	1,953	1,231	2,216	5,316	3,908

Data source: NCES, SEDA, U.S. Dept. of Ed., and State Dept. of Ed. (48 states): FY2017-2018

Table 3.6 SRSA rural eligible district characteristics under the new rural eligibility by locale codes (mean)

Variables	Census Locale Codes		
	Rural: Fringe	Rural: Distant	Rural: Remote
	41	42	43
Number of Schools	2.8	2.6	2.4
ADA	997	658	375
Poverty Rate (%)	16.4	18.8	21.2
Minority (%)	17.1	14.8	17.5
District Revenue & Spending (per pupil. $1000)			
Total Revenue	17.442	15.833	18.109
Federal Revenue	0.851	1.026	1.281
State Revenue	7.541	7.590	8.130
Local Revenue	9.050	7.217	8.698
Local Revenue Raising Effort (%)	51.9	45.6	48.0
Total Spending	16.912	15.528	17.908
Instructional Spending	8.430	7.728	8.575
Observations	1,677	5,080	3,888

Data source: NCES, SEDA, U.S. Dept. of Ed., and State Dept. of Ed. (48 states): FY2017-2018

Table 3.7 Dual eligible district characteristics by choice

Variables	Could have been dual (2017)	Dual eligible (2018)	RLIS Chosen (2018)	SRSA Chosen (2018)
Number of Schools	2.0	1.9	2.4	1.8
ADA	293	280	399.1	256
Poverty Rate (%)	28.1	28.3	29.8	28.1
Minority (%)	26.3	24.5	35.6	22.2
REAP Total Grant ($)	24,015	21,545	7,496	24,415
Title II Part A Funding ($)	21,008	20,205	38,740	16,448
District Revenue & Spending (per pupil. $1000)				
Total Revenue	16.553	17.965	17.937	17.970
Federal Revenue	1.384	1.526	1.676	1.496
State Revenue	7.828	8.349	9.166	8.182
Local Revenue	7.341	8.089	7.095	8.292
Local Revenue Raising Effort (%)	40.6	41.6	37.8	42.4
Total Spending	16.367	17.523	17.488	17.530
Instructional Spending	7.873	8.351	8.314	8.358
Observations	1,369	1,446	245	1,201

Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2017-2018

Table 3.8 RLIS recipient district characteristics comparison: 2017 vs. 2018

Variables	Before (2017)	After (2018)
Number of Schools	5.3	5.1
ADA	2,002	1,877
Poverty Rate (%)	28.8	29.0
Minority (%)	29.2	30.4
RLIS Total Grant ($)	47,193	35,463
District Revenue & Spending (per pupil. $1000)		
Total Revenue	12.677	13.651
Federal Revenue	1.375	1.397
State Revenue	7.011	7.419
Local Revenue	4.291	4.836
Local Revenue Raising Effort (%)	33.1	34.2
Total Spending	12.573	13.436
Instructional Spending	6.478	6.821
Observations	1,747	2,173

Data source: NCES, SEDA, U.S. Dept. of Ed., and State Dept. of Ed. (48 states): FY2017-2018

Table 3.9 SRSA recipient school district characteristics comparison (mean): 2017 vs. 2018

Variables	Before (2017)	After (2018)
Number of Schools	2.1	2.0
ADA	303	294
Poverty Rate (%)	19.0	18.4
Minority (%)	18.0	15.9
SRSA Total Grant ($)	27,267	27,197
District Revenue & Spending (per pupil. $1000)		
Total Revenue	17.351	18.380
Federal Revenue	1.077	1.129
State Revenue	7.590	7.781
Local Revenue	8.683	9.469
Local Revenue Raising Effort (%)	46.3	47.7
Total Spending	17.221	18.007
Instructional Spending	8.317	8.661
Observations	3,459	3,398

Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2017-2018

Table 3.10 RLIS recipient district changes due to the new locale code changes

Variables	2017 Recipients	Received in 2017, but Lost in 2018	Newly Received in 2018
Number of Schools	5.3	7.5	7.9
ADA	2,002	3,366	3,497
Poverty Rate (%)	28.8	29.1	29.0
Minority (%)	29.2	48.2	43.9
RLIS Total Grant ($)	47,193	80,005 (2017 amount)	67,610
District Revenue & Spending (per pupil. $1000)			
Total Revenue	12.677	12.030	13.226
Federal Revenue	1.375	1.390	1.385
State Revenue	7.011	6.944	7.567
Local Revenue	4.291	3.696	4.274
Local Revenue Raising Effort (%)	33.1	30.5	31.5
Total Spending	12.573	12.213	13.233
Instructional Spending	6.478	6.197	6.620
Observations	1,747	76	191

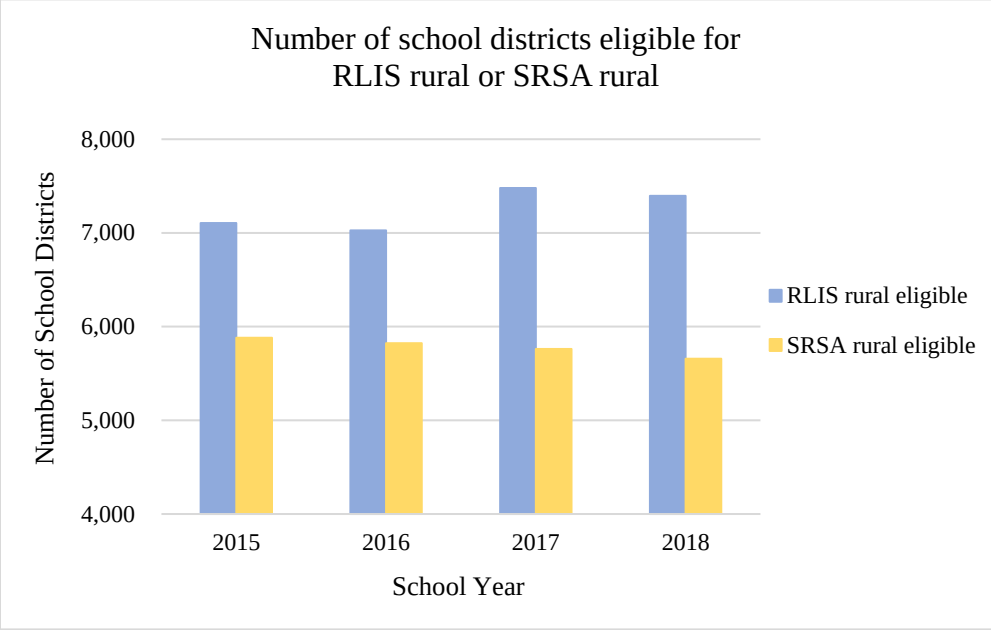
Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2017-2018

Table 3.11 SRSA recipient school district changes due to locale code changes in 2018

Variables	SRSA 2017 Recipients	Received SRSA in 2017 but Lost in 2018	Lost SRSA in 2018, but Received RLIS instead	Newly Received SRSA in 2018
Number of Schools	2.1	2.6	2.6	2.5
ADA	303	657	735	519
Poverty Rate (%)	19.0	23.6	29.9	20.1
Minority (%)	18.0	35.8	41.1	13.7
SRSA Total Grant ($)	27,267	36,977 (2017 amount)	13,376	37,493
Title II Part A Funding ($)	18,359	2,916	57,500	32,459
District Revenue & Spending (per pupil. $1000)				
Total Revenue	17.351	14.697	14.628	14.312
Federal Revenue	1.077	1.156	1.506	1.033
State Revenue	7.590	6.590	7.058	5.521
Local Revenue	8.683	6.952	6.065	7.759
Local Revenue Raising Effort (%)	46.3	41.2	36.0	53.1
Total Spending	17.221	15.022	14.685	13.103
Instructional Spending	8.317	6.977	6.716	6.676
Observations	3,459	80	44	11

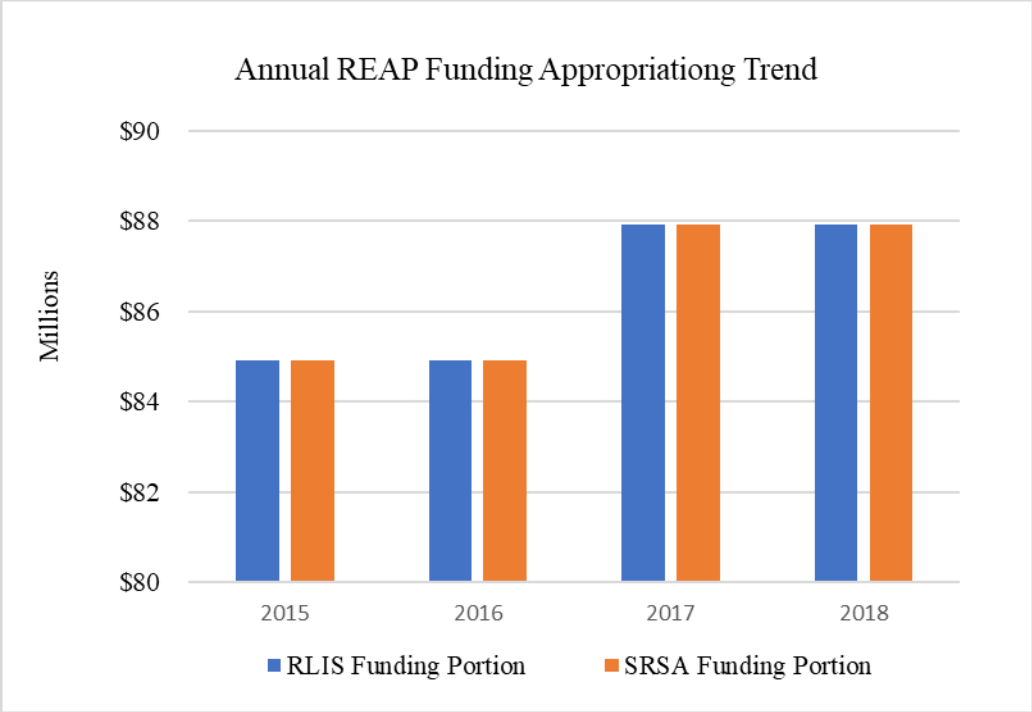
Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.1 Comparison of school districts eligible for under RLIS rural and SRSA rural definitions before (2015, 2016) and after (2017, 2018) policy change



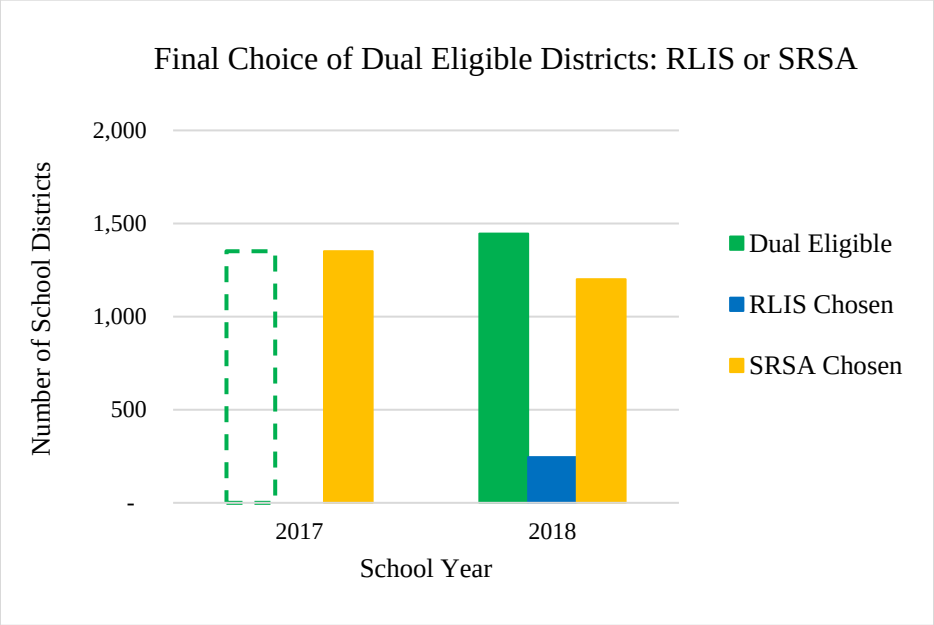
Data source: NCES, SEDA, ED, and State Dept. of Ed. (48 states): FY2015-2018

Figure 3.2 Annual REAP funding appropriation trend



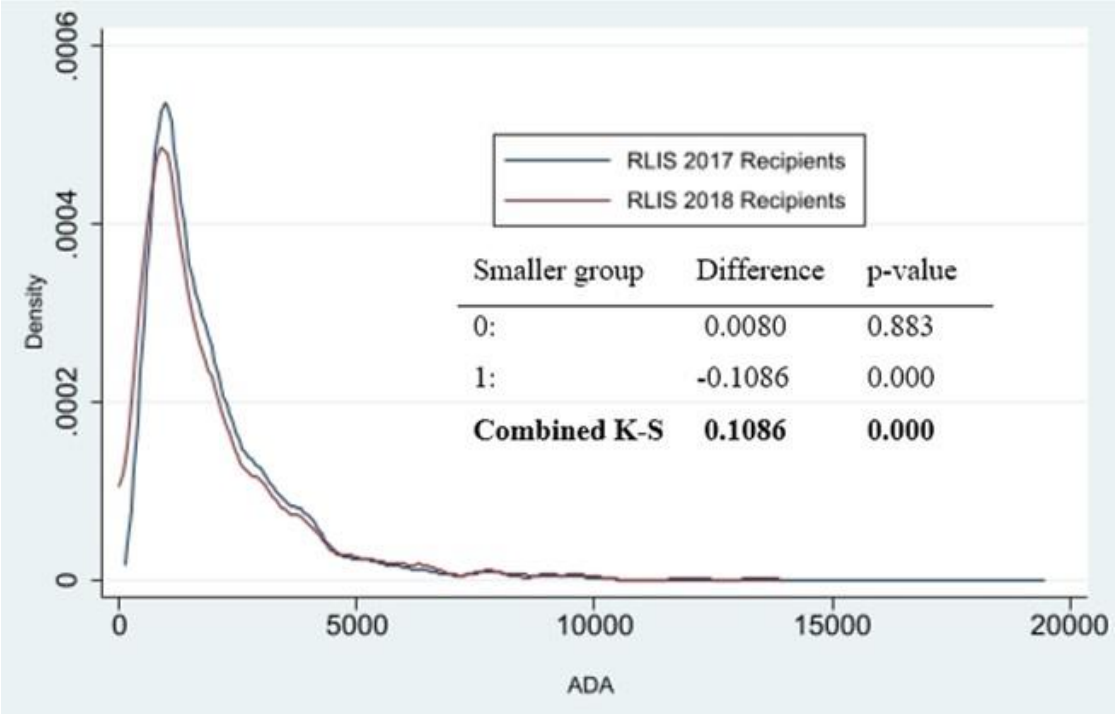
Data source: NCES, SEDA, U.S. Dept. of Ed., and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.3 Final Choice of Dual Eligible Districts: RLIS or SRSA



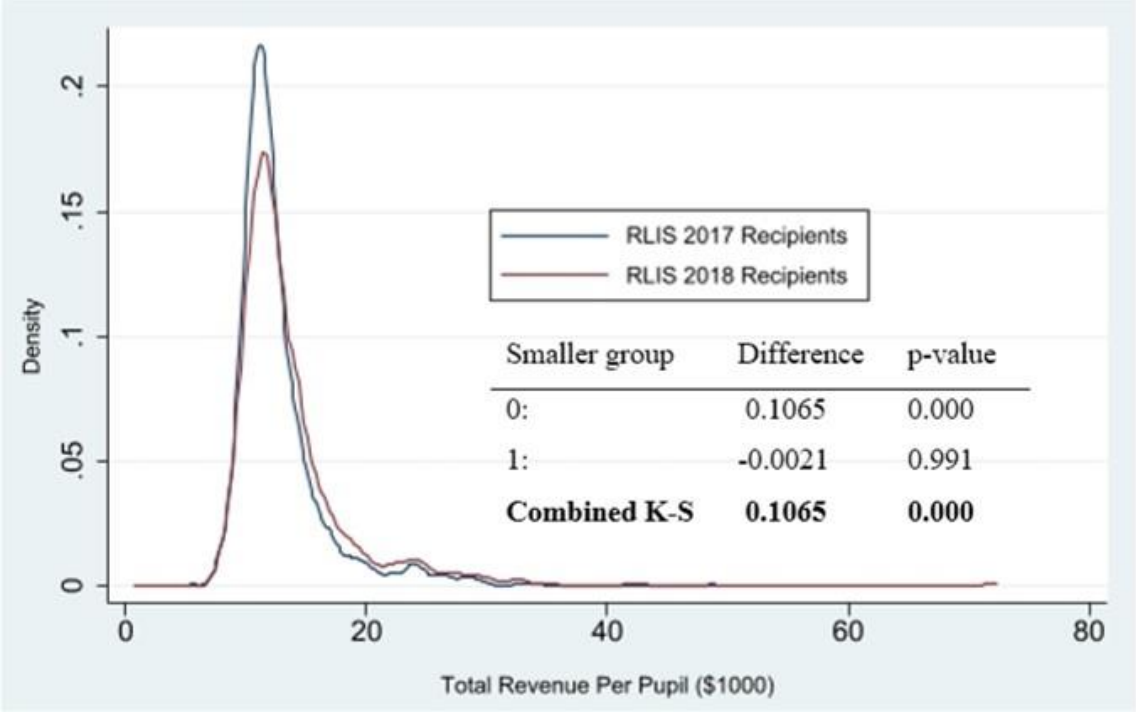
Data source: NCES, SEDA, U.S. Dept. of Ed., and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.4 RLIS Recipient Districts ADA Comparison: 2017 vs. 2018



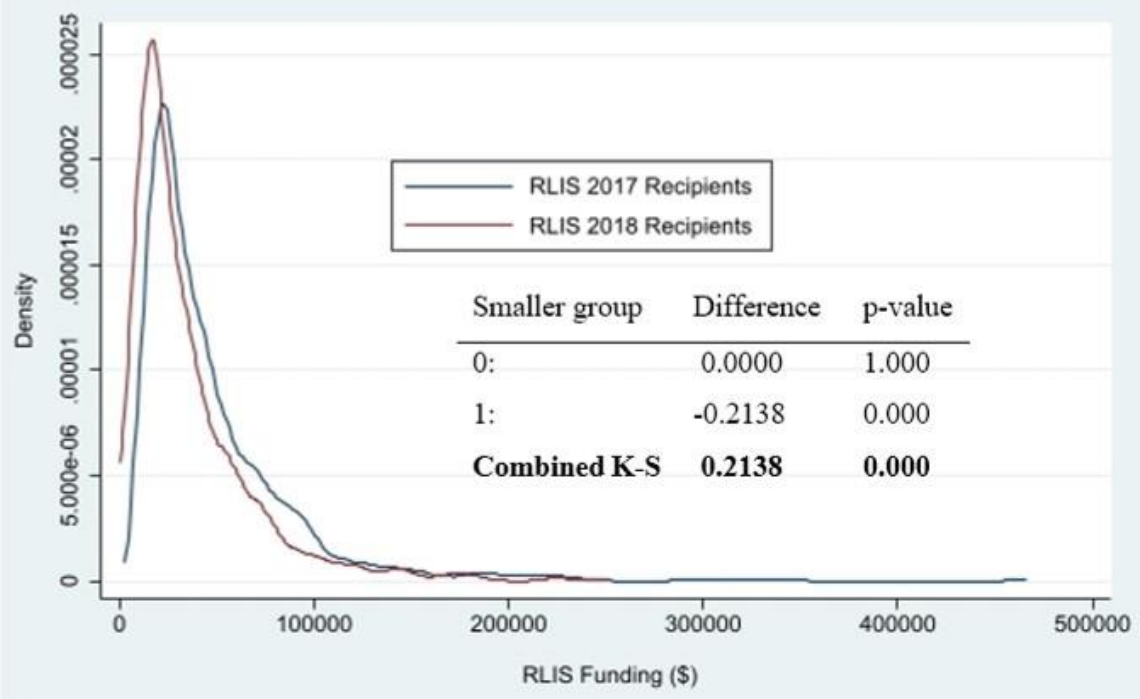
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.5 RLIS Recipients District Total Revenue Comparison: 2017 vs. 2018



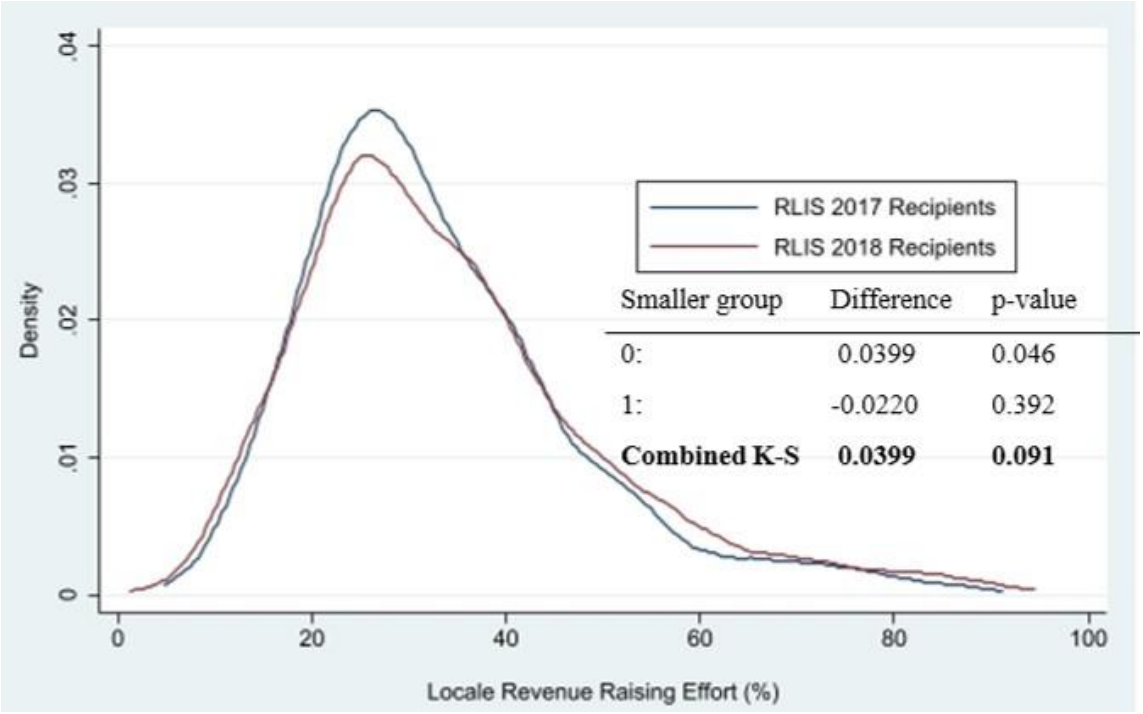
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.6 RLIS Recipients RLIS Funding Amount Comparison: 2017 vs. 2018



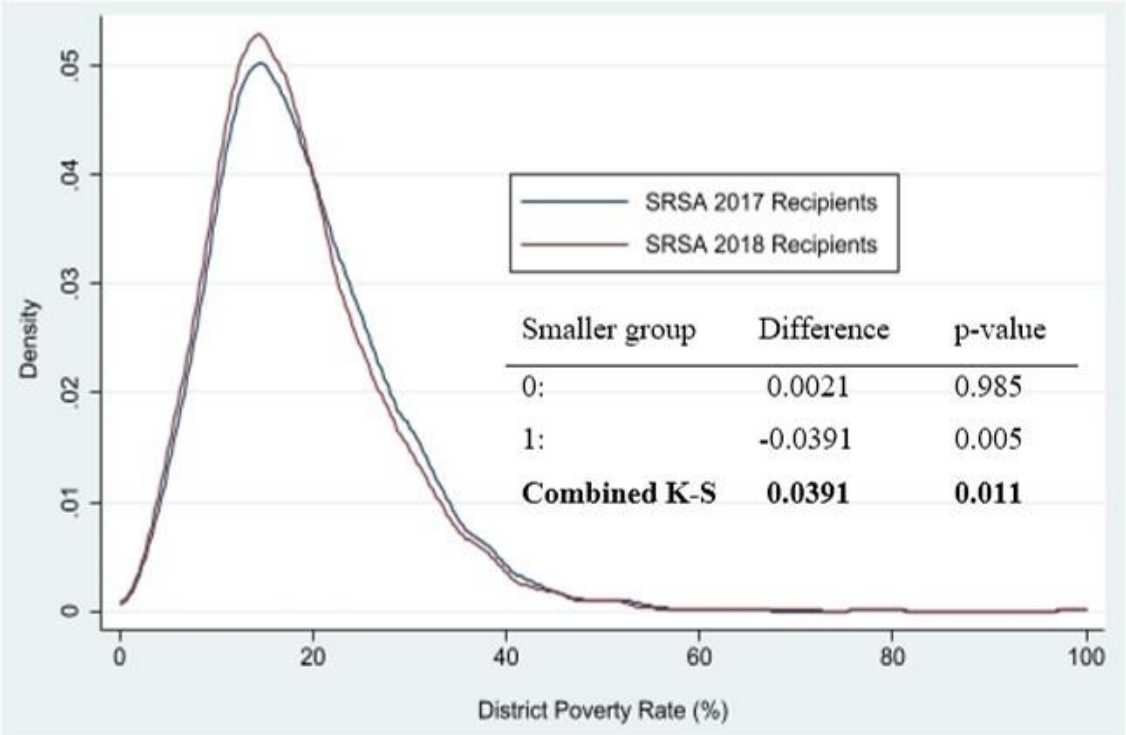
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.7 RLIS Recipients Local Revenue Raising Capability Comparison: 2017 vs. 2018



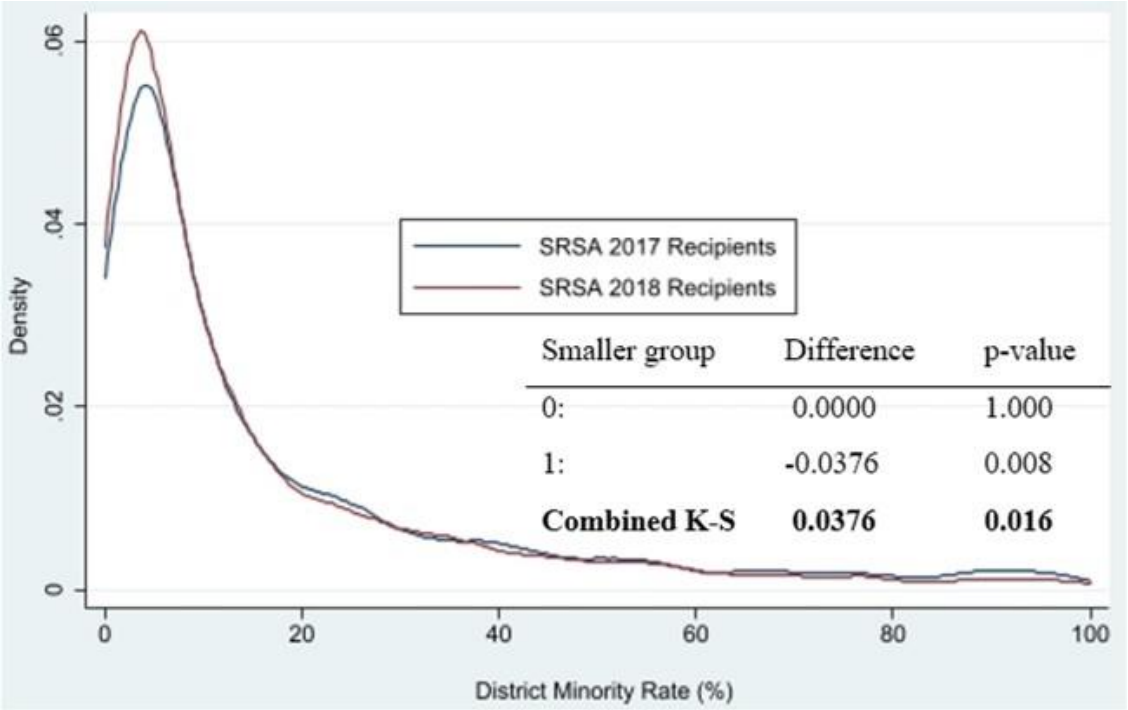
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.8 SRSA Recipients District Poverty Rate Comparison: 2017 vs. 2018



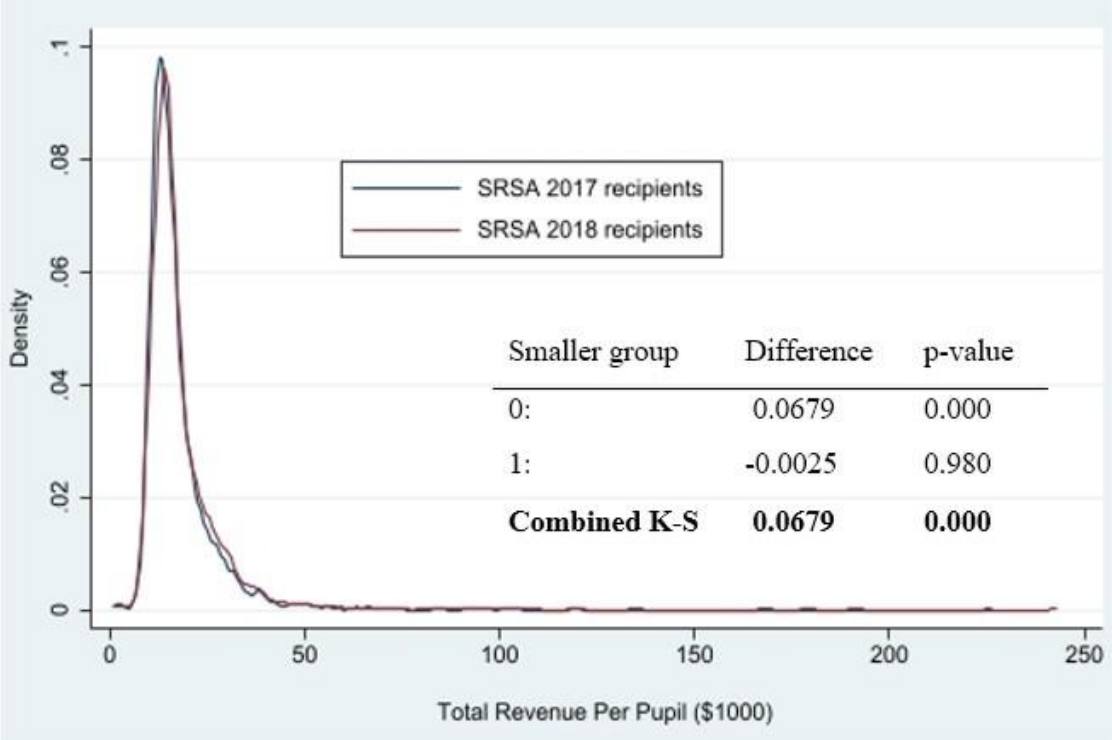
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.9 SRSA Recipients District Minority Rate Comparison: 2017 vs. 2018



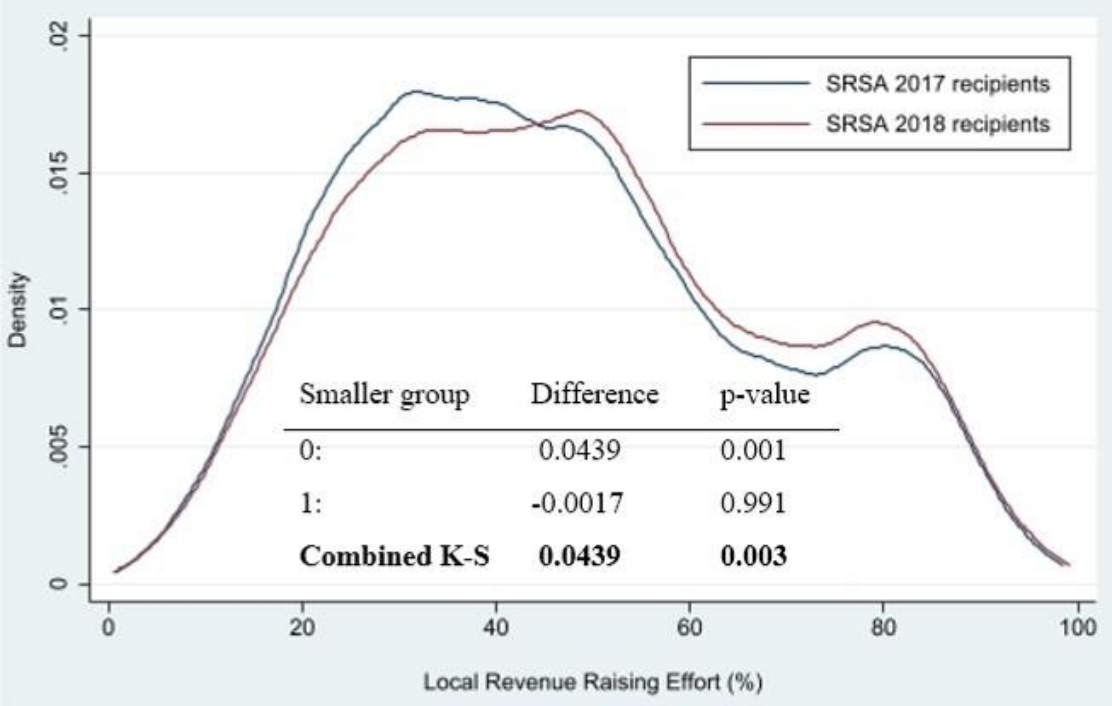
Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.10 SRSA Recipients Total Revenue Per Pupil Comparison: 2017 vs. 2018



Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

Figure 3.11 SRSA Recipients Local Revenue Raising Effort Comparison: 2017 vs. 2018



Data source: NCES, SEDA, U.S. ED, and State Dept. of Ed. (48 states): FY2017-2018

CHAPTER 4. DESCRIPTIVE REVIEW OF RURAL POLICY CHANGES ON STUDENT ACHIEVEMENT GAPS BETWEEN RURAL AND NON-RURAL SCHOOL DISTRICTS, AND WITHIN RURAL

4.1 Introduction

Rural education finance policy is not as widely studied as urban education. In many instances, researchers often utilized large administrative datasets from urban schools such as New York City, Los Angeles, Chicago, and Miami-Dade County taking advantage of data availability and greater sample size (De Gregorio et al., 2002; Dhaliwal et al., 2022; Hansen et al., 2016; Strunk et al., 2016; Leos-Urbel et al., 2013; Zabel, 2008; Aaronson et al., 2007; Jacob, 2005; Cullen et al., 2005).

Recently, there has been increased interest in rural education research, but many researchers studied area-specific programs or state-level policies. Some researchers investigated staffing/administrative issues (teacher turnovers in rural schools in Georgia (Williams et al. (2021)), staffing rural schools in California (Goldhaber et al.(2020)), hiring principals in rural schools in Wisconsin (Yang et al. (2021)) while others examine state policies related to school finance (property tax policy on rural district revenue in Kentucky (Combs and Foster (2021)), operating cost differences in rural Schools in Vermont (Kolbe et al. (2020)), funding reduction on rural student outcomes in Kansas (Rauscher, 2020)). However, there have been few recent studies to understand the broad overview of rural education with a nationwide dataset (Nguyen (2020) examines teacher attrition in urban and rural schools is an exception). To my knowledge, there are few studies looking at student outcomes focused on rural school districts in the U.S. on a national scale.

This study attempts to fill the gap in the field of rural education research by analyzing the recent Rural Education Achievement Program (REAP) eligibility policy changes and

historical trends of student academic outcomes using a national dataset. REAP is a major federal rural funding initiative established in 2002 to provide systemic, federal financial support to rural school districts in the U.S. The focus of the analysis will be on describing recent REAP funding eligibility changes and student academic achievement gap trends between rural and non-rural districts as well as the differences within rural districts.

I compare district-level academic performance on the NAEP tests in English language arts (ELA) and mathematics (math) in 2017 and 2019. In 2018, a change in the REAP funding eligibility policy expanded the number of districts and schools categorized as rural and thus eligible for receiving additional funds. I observe that poor rural districts experience test score increases in 2019, and the poorest districts show the largest gains. This study contributes to the existing literature by providing a descriptive analysis of federal rural finance policy changes that have not been studied yet.

4.2 Data

For this study, I created a school district-level, a national dataset for school years from 2011 to 2019. I assembled data from four different sources: (1) the Common Core Database (CCD) on the National Center for Education Statistics (NCES), (2) the U.S. Census Bureau, (3) the Stanford Education Data Archive (SEDA), and (4) the U.S. Department of Education (ED), Office of Elementary & Secondary Education (OESE).

First, I collected school district level data from the CCD on the NCES: demographic data from 'Local Education Agency (School District) Universe Survey Data', school finance data including detailed categories of revenue sources and expenditure from 'Local Education Agency (School District) Finance Survey (F33) Data', and geographic data from the 'Education Demographic and Geographic Estimates (EDGE) program.' Second, I

added the Small Area Income and Poverty Estimates (SAIPE) data from the U.S. Census Bureau as a school district poverty measure. Third, additional demographic, and socioeconomic data as well as student academic outcome data (i.e., the National Assessment of Educational Progress (NAEP) scores for English Language Arts (ELA) and mathematics) from the SEDA were merged. Lastly, I completed the national dataset by assembling the REAP funding eligibility data and district locality information from ED, Office of Elementary & Secondary Education as well as each state Department of Education where the data is available.

School districts in Alaska, Hawaii, and special school districts such as juvenile schools and military base school districts have been excluded from the dataset. In addition, to remove the outlying school districts with unusually high poverty rates, most American Indian (AI) school districts are excluded from the analysis if they have fifty percent or more AI students enrolled and/or receive more than $40,000 from Indian Education formula grant under Title VI in the previous fiscal year. The school districts with no record of the NAEP scores were removed as well.

4.3 What are new REAP policy changes?

There are two recent REAP funding eligibility policy changes in 2017 that affected rural district funding allocation starting in 2018. First, there was a rural definition change in rural eligibility for REAP funding as ED applied new locale codes for which school district localities would belong to rural. In other words, the federal rural definitions in the REAP eligibility were changed. Table 4.1 summarizes this definition change.[11]

[11] The table is reproduced from Oh (2023).

Second, a new ‘choice of participation’ provision was added to REAP policy statute allowing school districts to choose their preferred program when they qualify for both Rural Low-Income Schools Program (RLIS) and the Small, Rural School Achievement Program (SRSA), the two rural financial grant options under the REAP initiative. This new ‘dual-eligibility’ policy provides more independence and flexibility for school districts to make their own financial decision. Under the old policy, when rural school districts met the eligibility for both programs, they had to participate in SRSA. However, with the new dual eligibility being introduced, local school districts can choose the program that would provide more funding to them. Table 4.2 summarizes the new dual-eligibility criteria along with criteria for RLIS and SRSA.[12]

These new eligibility policy changes affect district funding status on whether a district would receive or lose the REAP funding as well as how much REAP funding a district would receive depending on their choice when it is an option. In the next section, I will describe an interesting relationship between REAP funds being reallocated with the REAP policy changes and changes in student achievement gap trends between rural and non-rural school districts. .

4.4 Analysis

In this study, the NAEP scores for ELA (often referred to as 'reading’) and math will be used as student academic outcomes. ELA and math assessments are administered every two years in grades 4 and 8. Since the NAEP tests are conducted every other year, the NAEP scores in years 2011, 2013, 2015, 2017, and 2019 will be examined.[13] I am

[12] The table is reproduced from Oh (2023).
[13] It should be noted that the next NAEP test administration after 2019 occurred in 2022, due to COVID.

specifically interested in describing the changes in the existing achievement gap trends (1) between rural and non-rural school districts and (2) within rural school districts.

As the NAEP assessments are performed between January and March of the test year, looking at the NAEP scores in 2019 will be appropriate in relation to the changes in REAP funding distributed to school districts in 2018

The standard deviations of NAEP test scores will be used as an outcome measure. They are generated in comparison to the national NAEP average score, which is equal to '0' on this metric. For example, if a district has a standard deviation of -0.1 recorded as its ELA score, it means the district's average ELA score is 10% of one standard deviation lower than the national ELA average score.

4.4.1 District achievement gaps between rural and non-rural school districts

4.4.1.1 Overall score trends: Rural vs. Non-rural school districts

Both ELA and math score trends in Figure 4.1 shows that non-rural districts performed better maintaining their scores above the national average (except math scores in 2015) while their rural counterparts performed below the national average. Between 2017 and 2019, there were no substantive changes in the gap in test scores across rural and non-rural districts. ELA scores remained relatively stable. Both sets of districts experienced very small declines (about 0.6% of one standard deviation). Overall, math scores improved for both rural and non-rural districts by about 3-4% of one standard deviation. There are two trends worth noting. First, especially for math, test scores had been increasing steadily at least since 2015. Second, it appears that there was very little observable change in the trend of academic performance in 2019. However, when dividing rural and non-rural school districts into two groups by the poverty eligibility threshold for

the RLIS funding (i.e., one group is the districts with a poverty rate of 20% or more, and the other is the districts with a poverty rate less than 20%), the score trends look considerably different, especially among districts with the poverty rate above 20%.

4.4.1.2 ELA and math score trends by poverty eligibility threshold of 20%

First, contrary to Figure 4.1, academic performance for these districts seems to be decreasing from 2013 to 2017, for both ELA and math. Second, as seen in Figure 4.2, rural school districts outperformed non-rural ones for both ELA and math among the districts with a poverty rate above 20%.

For rural districts within this poverty group, the ELA scores increased moderately by about 2.6% of one standard deviation while the math scores increased significantly by about 9% of one standard deviation. However, even with this visible increase for rural districts, the ELA score gap between rural and non-rural only increased by 1% of one standard deviation while the math score gap actually shrank by 3.6% of one standard deviation because non-rural districts also improved their performance for both subjects, especially for math (12.6% of one standard deviation).

Among relatively affluent districts (with a poverty rate of less than 20%), non-rural districts perform better than rural districts in both ELA and math as shown in Figure 4.2. However, in this lower poverty group, rural districts perform better than the national average for both subjects, which is distinctively different from the overall trend where rural districts perform below the national average for both ELA and math. The achievement gaps between rural and non-rural have not changed visibly between 2017 and 2019, only revealing less than 1% of one standard deviation change, while the gap decreased for ELA but increased for math. The descriptive analysis in Figures 4.1 to 4.2 reveals that looking

at the score trends between rural and non-rural districts by grouping them with different poverty level yields new insight that was otherwise hidden in the overall trend.

In the next section, I will investigate the performance trends by focusing on the achievement gaps *within* rural. For more in-depth analysis, I will divide all rural school districts (1) by poverty level (two different grouping: by quartiles and by RLIS eligible poverty threshold), (2) by locality, and within each locality by poverty threshold, and (3) by funding status change (i.e., the district that newly funded vs. the districts that lost their funding due to REAP policy changes), and (4) by minority student concentration.

First, I will divide rural districts into quartiles by poverty rate to see whether poorer or richer districts show different trends. In addition, I will split rural districts into two groups by RLIS funding eligible poverty threshold (20%) to see if RLIS-eligible districts that are qualified to receive funding show any changes in their score trends in 2019. I will also review the score trends of only the districts that are qualified to receive the funding by their poverty level dividing them into quartiles.

Second, I will describe the score trends *within* rural by localities in relation to RLIS policy definition change (i.e., newly implemented locale codes that define which school districts belong to rural). Then, I will look at the trend within each locality by poverty threshold (20%). A separate analysis by district size eligibility for SRSA funding (i.e., ADA of fewer than 600 students or a population density of fewer than 10 persons per square mile) was not conducted due to a small sample size of SRSA-eligible districts with NAEP scores being available.

Third, I will review the score trends between rural districts that received the funding after new REAP policy changes (i.e., rural definition (locale code) change and dual-

eligibility provision) and the districts that lost REAP funding as a result of the new rural definition change.

Lastly, as rural America is often portrayed as comprised of majority white populations, REAP policy might be viewed as mainly benefitting white students more than other minority students. To explore the score trends regarding this ethnicity issue, I will explore whether rural school districts with different levels of racial diversity show distinct trends for their academic outcomes between 2017 and 2019.

4.4.2 District achievement gaps within rural

4.4.2.1 ELA and math score trend by poverty level (by quartiles)

First, I examine if rural districts with different levels of poverty show unique score trends, especially looking for any notable changes between 2017 and 2019. For this analysis, all newly defined RLIS rural school districts are divided into quartiles by their poverty rates to see whether poorer or richer districts show any difference in their trends.

In Figure 4.4, both ELA and math score trends show that rural districts with the lowest poverty level (1st Quartile (Q1) with the average poverty rate being 10%) achieved well above the national average, about 20~30% of one standard deviation higher than the national average throughout the years. Then it was followed by school districts in Q2 (2nd lowest (or lower poverty) with the average poverty rate being 17.7%) performed at the level around the national average. On the other hand, all the other school districts that belong to Q3 (school districts with 2nd highest poverty (or higher poverty) with their average poverty rate being 24.4%) and Q4 (the highest poverty school districts with the average poverty rate being 35.1%) performed below the national average. Specifically, it is notable that school districts in Q4 performed significantly below the national average

throughout the years having 20~40% of one standard deviation lower than the national average.

However, when focusing on the changes between 2017 and 2019, the change in performance for districts in each quartile is quite different from the test score level described above. For the ELA score trend, the Q1 district score decreased by 3.7% of one standard deviation, and the Q2 district score decreased by about 1% of one standard deviation. In contrast, Q3 and Q4 districts increased their scores by 2.5% and 5% of one standard deviation, respectively. As a result, the achievement gap between Q1 and Q4 decreased significantly, by about 9% of one standard deviation.

For math, the changes are more pronounced. Q1 math score is reduced by a little less than 1% of one standard deviation when math scores in all the other quartiles (Q2, Q3, and Q4) increased; Q2 and Q3 have a moderate increase of 2.5% and 4.6% of one standard deviation, respectively while Q4 score jumped by 14.1% of one standard deviation showing that the poorest rural districts improved their academic outcomes most drastically. Consequently, the gap between Q1 and Q4 is reduced by 15% of one standard deviation.

4.4.2.2 ELA and math score trends by poverty eligibility threshold of 20%

Within rural, I will review the trends to see if different score trends exist between the districts that meet the poverty criteria to receive RLIS funding and the ones that do not meet the poverty requirement. For the analysis, I split rural districts into two groups by RLIS funding eligible poverty threshold (20%) to see if RLIS-eligible districts that are qualified to receive funding show any differences in their score trends since the new rural definition policy was implemented after 2017.

Unsurprisingly, districts below the RLIS poverty threshold (that are relatively affluent) performed better, on average 30~35% of one standard deviation higher than the poorer districts with poverty rate above 20%. When looking at the change between 2017 and 2019, in Figures 4.5, ELA scores of the districts with a poverty rate higher than 20% increased by 2.6% of one standard deviation while the districts with a poverty rate below 20% decreased by 2.4% of one standard deviation resulting in an academic gap reduction of about 5% of one standard deviation. For math scores, the change is more dramatic. The math scores of the districts with a poverty rate of over 20% increased by 9% of one standard deviation while the scores of the districts with a poverty rate below 20% stayed nearly the same, leading to a gap reduction of 9% of one standard deviation.[14]

4.4.2.3 ELA and math score trend by poverty level (by quantiles) within RLIS funding qualified districts

With the trend above in mind, now I will look at the score trends of only the districts that are qualified to receive the funding by their poverty level dividing them into quartiles.[15] All the rural districts included in this analysis have a poverty rate above 20%. To further investigate if all RLIS-eligible districts with different degrees of poverty would display different trends, I divided all eligible districts into quartiles. The mean poverty rate for each quartile is as follows: Q1=21.8%, Q2=25.5%, Q3=30%, Q4=39.2%.

For both ELA and math scores, all RLIS funding-eligible districts perform lower than the national average. As seen in Figures 46, the lowest poverty districts (Q1) perform

[14] Clearly, caution is warranted in attempting to link these test score improvements to REAP funding. Beyond the fact that the figures are descriptive analysis, the magnitude of the increase seems too large to attribute to the modest increase in funding districts would experience. See Oh (2023) for an in-depth description of REAP funding.

[15] It is worth emphasizing the differences between Figures 4.4 and Figures 4.6. While Figures 4.4 include all rural districts, Figures 4.6 only include rural districts that receive REAP funding due to their high poverty status. As such, the poverty quartile cut-points are different across the two sets of figures.

moderately lower than the national average. The average scores of all the other districts are lower than Q1 followed by their poverty level (i.e., Q2, Q3, and Q4 in order). The rural districts with the highest poverty (Q4) have the lowest scores that are significantly lower (20% of one standard deviation lower) than Q1.

When looking at ELA score changes between 2017 and 2019, the notable trend is that the highest poverty districts (Q4) increased scores by 5.5% of one standard deviation. This is a large gain compared to all other districts as Q1 and Q2 have a small increase of 1.7% and 0.9% of one standard deviation, respectively and Q3 has a modest increase of 2.7% of one standard deviation. As a result, the gap between Q1 and Q4 decreased by 4% of one standard deviation.

For math scores, all districts (Q1~Q4) have greatly improved their scores in 2019 compared to 2017. Especially, Q3 and Q4 (high poverty districts) show incredible progress of 10% and 16% of one standard deviation increase in order. The large gain by Q4 made the gap between Q1 and Q4 shrink by 10% of one standard deviation.

Perhaps most important point is that all districts experienced academic gains, but the gains were inversely related to the poverty status of the districts: the most disadvantaged districts showed the largest improvements in their test scores in both ELA and math, between 2017 and 2019. This is especially noteworthy because test scores were trending downward in both subjects across all poor rural districts before 2019, and especially in math, the decline was steeper for poorer (Q3 and Q4) districts.

It is worth emphasizing again the purpose of this study is to closely observe the current trends (in this case, academic outcome changes) through descriptive analysis with

the potential of providing a good foundation or starting point for future research that might be done in a manner of causal analysis.

4.4.2.4 ELA and math score trends by locality within RLIS defined Rural

I will look at the score trends within rural districts that are RLIS funding eligible by localities in relation to RLIS definition change (i.e., newly implemented locale codes that define which school districts belong to rural).

Exploring ELA and math score trends through the lens of locality reveals that each locality shows a different level of academic outcomes with small to moderate degrees of dynamic changes.

I specifically take a close look at the data focused on comparing their scores in the most recent years between 2017 and 2019 as a new rural definition change in RLIS eligibility policy was implemented in 2018. For ELA scores, Rural Fringe (41) and Remote Rural (43) experienced score declines by a moderate degree, around 2% of one standard deviation while Remote Town (33) had a moderate increase (2% of one standard deviation). Distant Town (32) and Distant Rural (42) localities stayed around the same level. On the other hand, math score trends painted different pictures in terms of locality. Distant Town (32) and Distant Rural (42) had a big increase of around 4% of one standard deviation while Remote Town (33) and Rural Fringe (41) had a small to moderate level of increase (2-3% of one standard deviation). The only locality where their scores decreased by 2% of one standard deviation was Remote Rural (43). The graphs by locality in Figure 4.7 indicate academic outcomes differ in rural school districts in diverse localities, but they did not reveal whether poverty level also plays a distinct role in the analysis by locality yet. In the next section, I will specifically look into the score changes between 2017 and 2019

by locality considering their poverty rate by dividing groups at the poverty threshold (20%) for RLIS funding.

4.4.2.5 ELA and math score trends by locality by poverty threshold of 20% within RLIS defined Rural

In Figures 4.8-4.12, in all localities, the districts with a poverty rate below 20% performed above or right around the national average while the districts with a poverty rate above 20% consistently performed at least 10-20% of one standard deviation lower than the national average. However, in 2019, all the districts with a poverty rate of 20% or more increased their scores for both ELA and math: the increase for ELA was rather small to a moderate amount compared to math displaying a remarkable increase of 7%~12% of one standard deviation.

The achievement gaps between these two different poverty groups all decreased except for Remote Rural (43) locality showing its gap being widened for ELA and stayed the same for math. The figures reveal that the test score improvements in these poor rural districts were broadly observed across different localities.

4.4.2.6 ELA and math score trend: Newly funded (2018) vs. Lost funding (2018)

Lastly, I will review the score trends between rural districts that received the funding after new REAP policy changes (i.e., rural definition (locale code) change and dual-eligibility provision) and the districts that lost REAP funding as a result of the new rural definition change.

In Figures 4.13, the ELA scores of newly funded rural districts had a modest increase of 2.2% of one standard deviation while the districts that lost funding stayed at the same level (increased by 0.2% of one standard deviation); therefore, the gap between the two

groups decreased by 2% of one standard deviation. Compared to this modest change in ELA scores, the math scores in newly funded rural school districts soared by 9.4% of one standard deviation. As the districts that lost funding also moderately increased by 3.1% of one standard deviation, therefore, the gap between the two groups visibly decreased by a large amount (6.3% of one standard deviation).[16]

4.4.3 District achievement gaps and minority students within rural

A commonly held notion is that rural America is mostly white with little racial diversity, unlike their non-rural (especially, urban) counterparts (Lichter, 2012). To explore this perception, I look at the trends by minority student concentration (%) to see if rural school districts with different levels of minority population (%) show different trends for their academic outcomes between 2017 and 2019. First, it is important to note that many rural districts contain ethnically diverse populations. Dividing rural districts into quartiles for percent minority, the cut-points for Q1 to Q4 are 6%, 18%, and 43%.

For both ELA and math score trends, in Figure 4.14, the districts with the highest minority population (Q4) perform significantly lower than the national average as well as districts with fewer minority students (Q1~Q3). As we observed in other trends, ELA scores had subtle changes in all quartiles, and the gap between Q1 and Q4 remained unchanged. However, the changes are much more visible in the math score trend, specifically for Q3 and Q4, two high minority districts in the dataset. While low minority districts (Q1 and Q2) experienced modest math score increases (by 1-2% of one standard deviation) in 2019, high minority districts (Q3 and Q4) experienced much higher score

[16] Again, the small increase in test scores for districts that lost funding is puzzling. It may be that there was a national trend toward increasing achievement in ELA and math.

increases: Q3 being boosted by 10% of one standard deviation and Q4 by 17% of one standard deviation increase.

The figures demonstrate that the test score increases observed in rural districts in 2019 were not isolated only to districts with majority white student populations. In fact, the largest gains were seen in districts that were most heavily populated by minority students.

4.5 Conclusion

Through detailed descriptive analyses, this study shows that student academic achievement (ELA and math scores) trends conditional on the state of the rural district in their poverty levels, localities, or minority populations can reflect a complex set of changes observed before and after the REAP policy changes. Simply comparing rural and non-rural districts in aggregate can obscure the valuable information about diverse rural districts.

It is straightforward to demonstrate that the REAP funding change allocated more funding to rural districts and funds flowed to larger numbers of traditionally disadvantaged students. As shown in Table 4.3, new REAP rural policy changes led to an increased number of rural districts receiving the funding in 2018. The funding supports more minority students and students in poverty status in rural districts. The RLIS funding amount for each school district is small to moderate (Oh, 2023). However, it still affects 2% of the U.S. student population and 3% of all poor, minority students. If we describe the results within rural districts, the difference is even bigger, with funding distributed to districts that contain 8% of all rural students, 11% of all rural students in poverty status, and 15% of all rural minority students.

This study reveals that student academic outcomes trends differ between rural and non-rural districts. Overall, non-rural districts perform better than rural districts. However, by analyzing these two groups by poverty level, rural districts actually do better than non-rural districts among high-poverty districts. Specifically, this paper shows that the achievement gap trends show interesting patterns which occurred simultaneously with REAP policy changes. Schools receiving additional funding from the program exhibited positive improvements in student test scores, especially for disadvantaged school districts with high poverty and high minority. The analysis by locale codes that newly defined who belong to rural reveals that different localities show various levels of student outcomes that could be further investigated in the future.

The purpose of this study is not to find a causal connection between REAP policy and rural academic outcomes but to review the achievement gap trends of rural districts in a descriptive manner, before and after the change of the new rural funding eligibility. This analysis provides a more nuanced picture of rural districts so that future studies can look for the causal effect of REAP policy changes on rural districts.

4.6 Tables and Figures

Table 4.1 REAP rural eligibility associated with locale codes before and after the policy change

Locality	Before the Change			After the Change		
	Code	Name	Descriptions	Code	Name	Descriptions
Town	6	Small Town	An incorporated place or Census-designated place with a population less than 25,000 and greater than or equal to 2,500 and located outside a CMSA[17] or MSA[18].	32	Town: Distant	Territory inside an urban cluster (UC[19]) that is more than 10 miles and less than or equal to 35 miles from an urbanized area (UA[20]).
				33	Town: Remote	Territory inside a UC that is more than 35 miles from a UA.
Rural	7	Rural, Outside MSA	Any territory designated as rural by the Census Bureau outside a CMSA or MSA of a Large or Mid-size City.	41	Rural: Fringe	A census-defined rural territory that is less than or equal to 5 miles from a UA, as well as rural territory that is less than or equal to 2.5 miles from a UC.
	8	Rural, Inside MSA	Any territory designated as rural by the Census Bureau within a CMSA or MSA of a Large or Mid-size City.	42	Rural: Distant	A census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from a UA, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from a UC.
				43	Rural: Remote	A census-defined rural territory that is more than 25 miles from a UA and also more than 10 miles from a UC.

[17] CMSA: An area that meets the requirements to qualify as an MSA and also has a population of one million or more.

[18] MSA: A metropolitan area consists of one or more counties that contain a city of 50,000 or more populations or contain a UA

[19] UC: An urban cluster that has at least 2,500 and less than 50,000 people.

[20] UA: An urban area consists of 50,000 or more people.

Table 4.2 RLIS, SRSA, and Dual-Eligible district eligibility criteria

	RLIS	SRSA	Dual-Eligible
Rural Eligibility	All schools within the district must have a locale code of 32, 33, 41, 42, or 43.	All schools within the district must have a locale code of 41, 42, or 43.	All schools within the district must have a locale code of 41, 42, or 43.
Low-Income Eligibility	20% or more of the children ages 5 to 17 served by the district must be from families with incomes below the poverty line.	Not Required	20% or more of the children ages 5 to 17 served by the district must be from families with incomes below the poverty line.
Small Size Eligibility	Not Required	A district must have a total average daily attendance (ADA) of fewer than 600 students or exclusively serve schools that are in counties with a population density of fewer than 10 persons per square mile.	A district must have a total average daily attendance (ADA) of fewer than 600 students or exclusively serve schools that are in counties with a population density of fewer than 10 persons per square mile.
Funding Limits	No Limits	The maximum amount of funds a district may receive is $60,000.	Following the funding limit of their choice of the program.

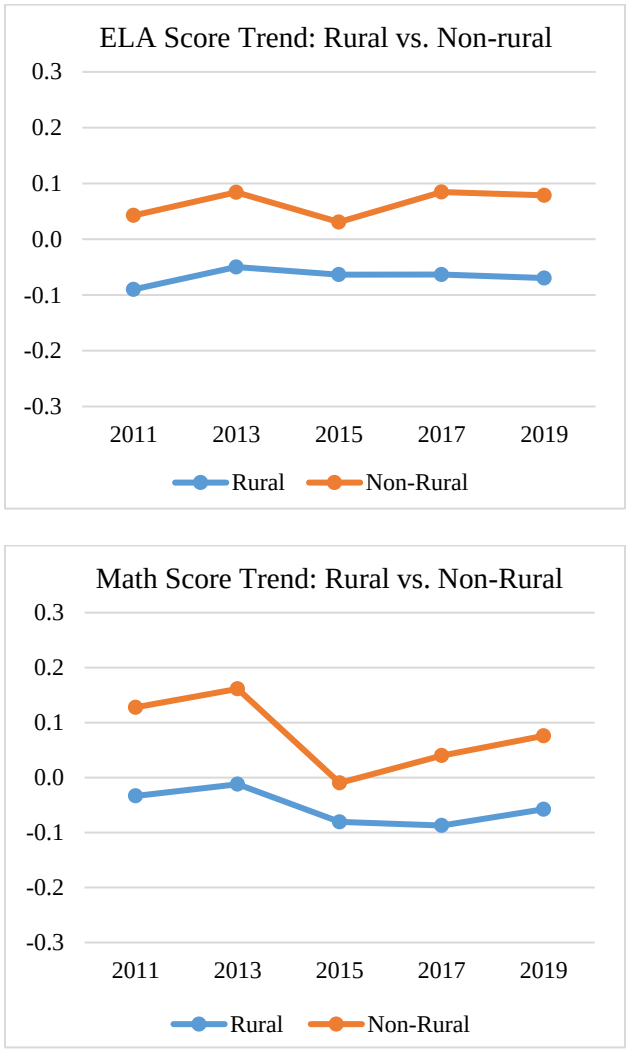
Data source: U.S. Department of Education, Office of Elementary & Secondary Education website. 2019

Table 4.3 The summary of new rural policy changes on school districts in 2018

Variables	Districts that newly get funding (A)	Districts that newly lose funding (B)	Net Change (A-B)	REAP rural districts	All districts (including non-rural)
Total funding ($) gained or lost	Total Gain $13,270,393 (RLIS: $12,857,970 SRSA: $412,423)	Total Loss $5,980,857 (RLIS: $4,839,205 SRSA: $1,141,652)	Total Net Gain $7,289,536 gained (RLIS: gained $8,018,765 SRSA: lost $729,229)		
Total number of minority students	346,293	139,001	207,292	2,351,875	13,976,297
Total number of students in the poverty status	186,887	75,557	111,330	1,743,246	6,171,286
Total number of students	717,382	291,340	426,042	8,855,328	33,375,390
Total number of schools	1,536	633	903	21,964	61,149
Total number of districts	202	97	105	4,655	7,550

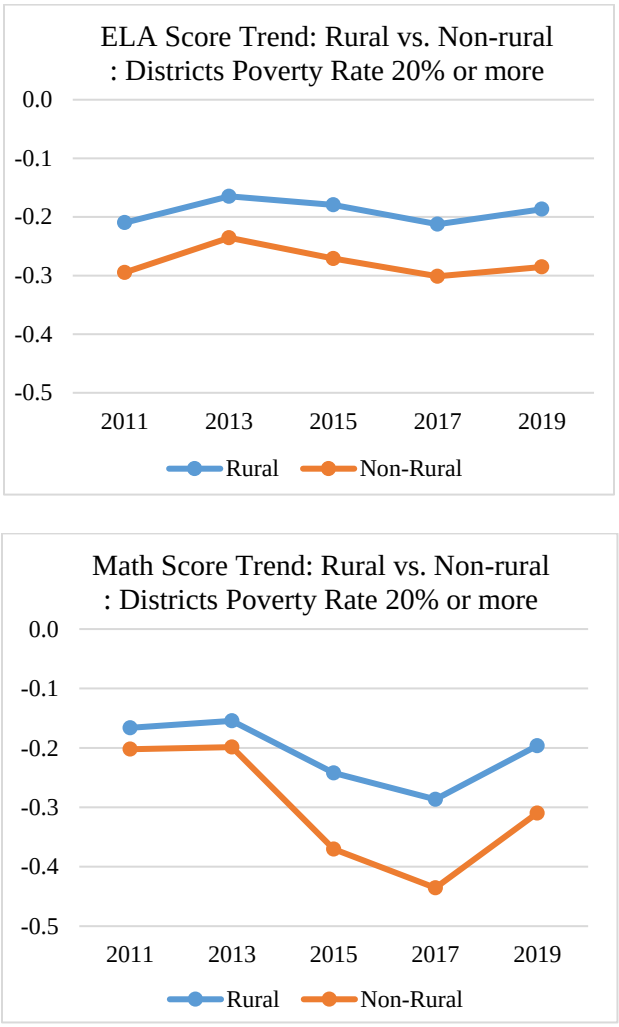
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education, 2018

Figure 4.1 ELA and math score trend: rural vs. non-rural school districts



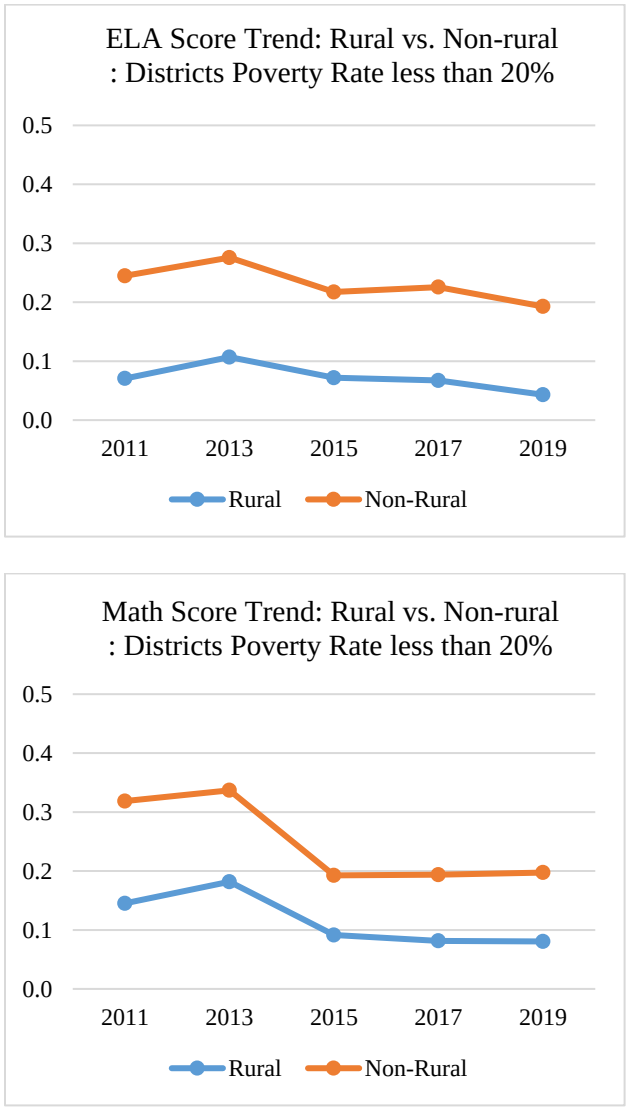
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.2 ELA and math score trends among districts with a poverty rate above 20%



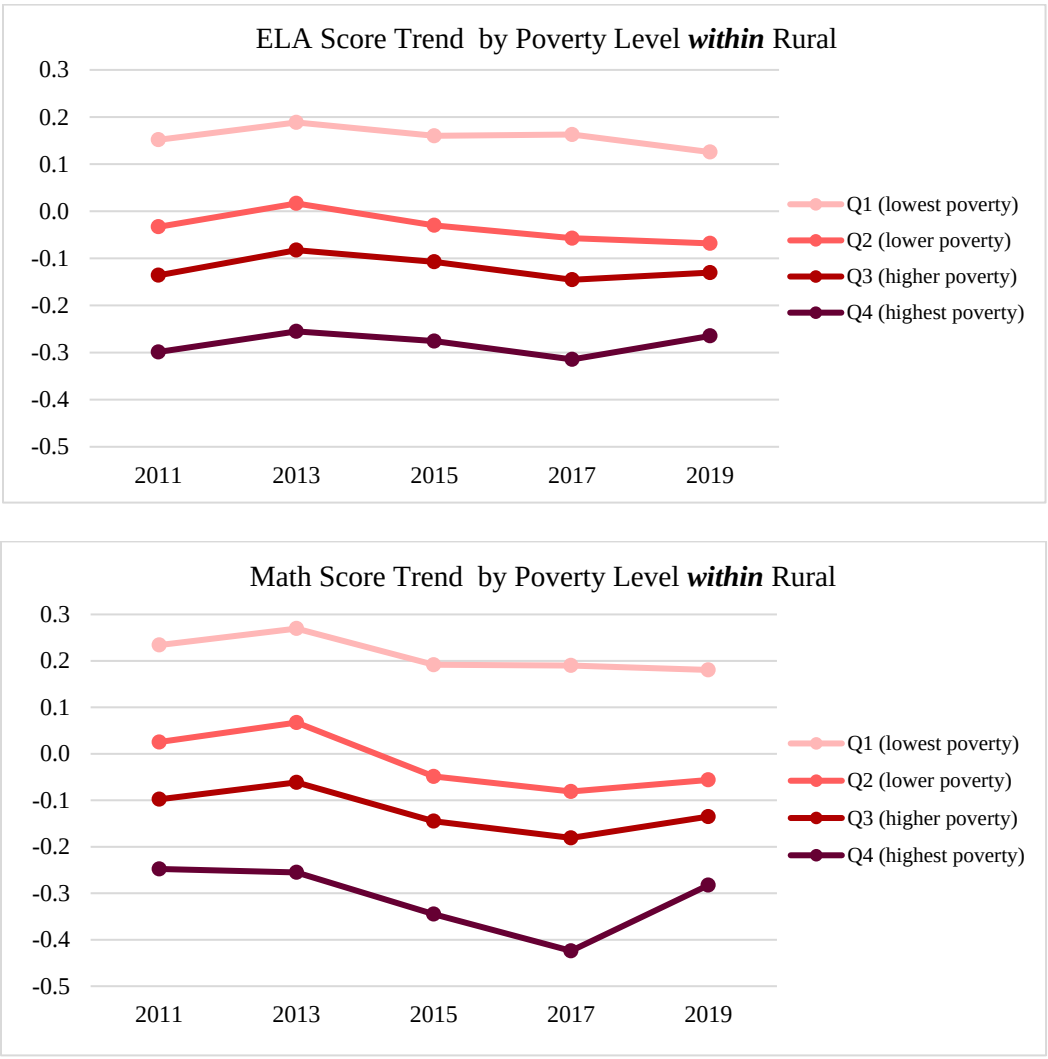
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.3 ELA and math score trends among districts with a poverty rate below 20%



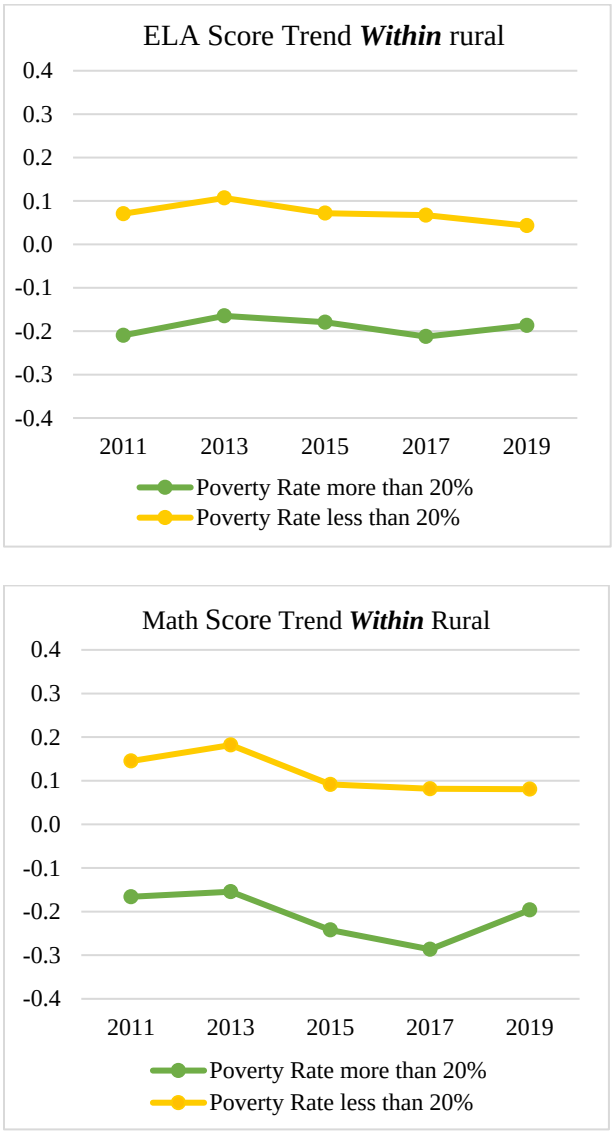
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.4 ELA and math score trends by poverty level within rural districts



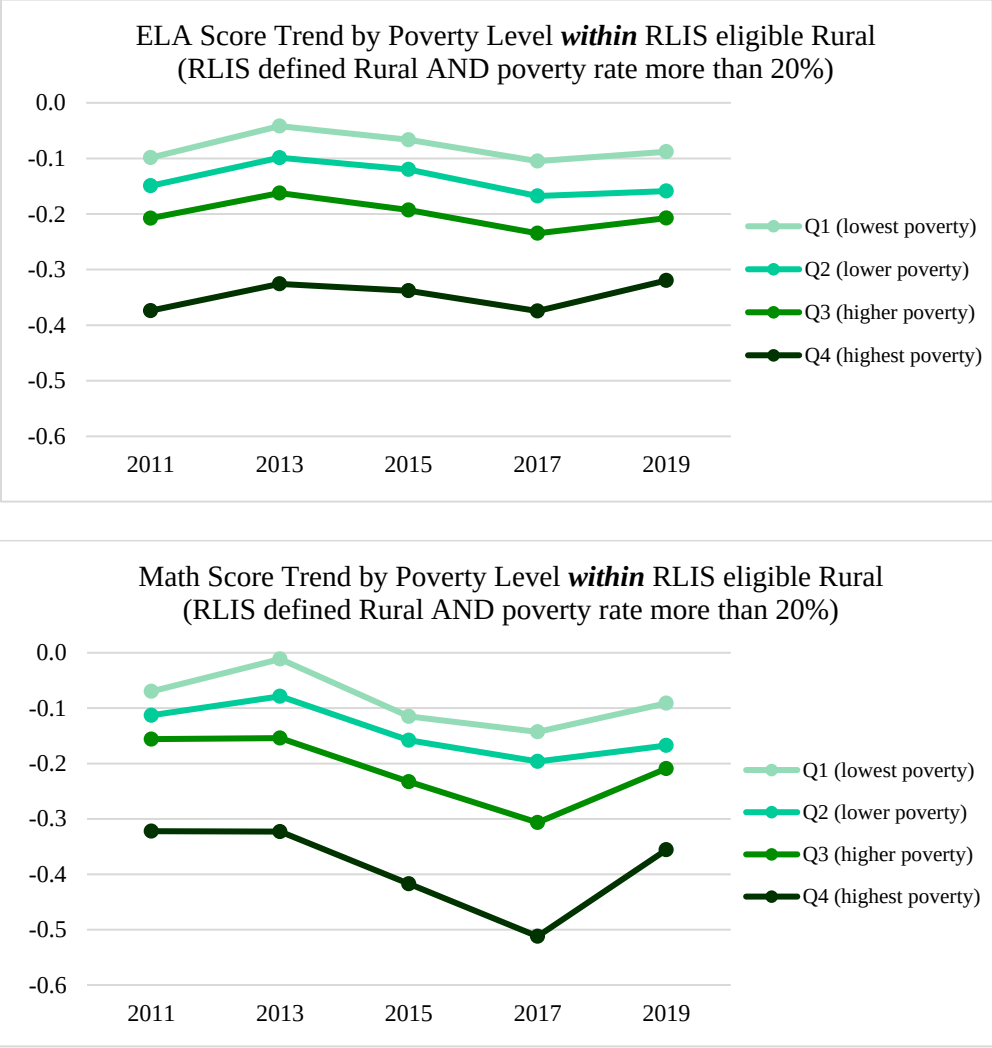
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.5 ELA and math score trend by poverty level (poverty threshold 20%)



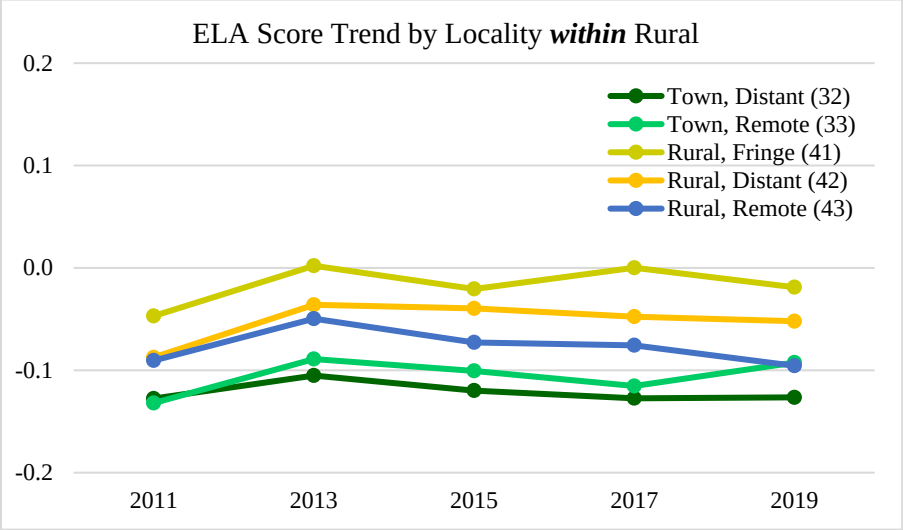
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

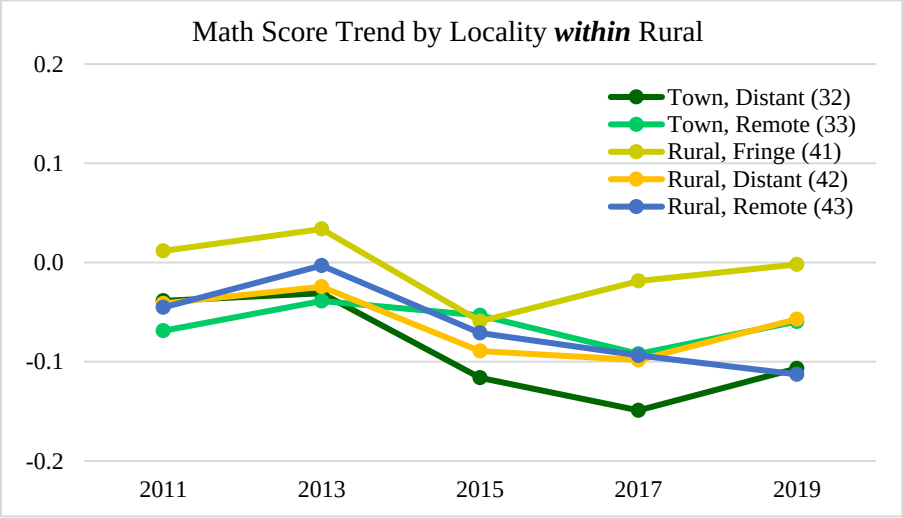
Figure 4.6 ELA and math score trends by poverty level within RLIS-eligible districts



Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

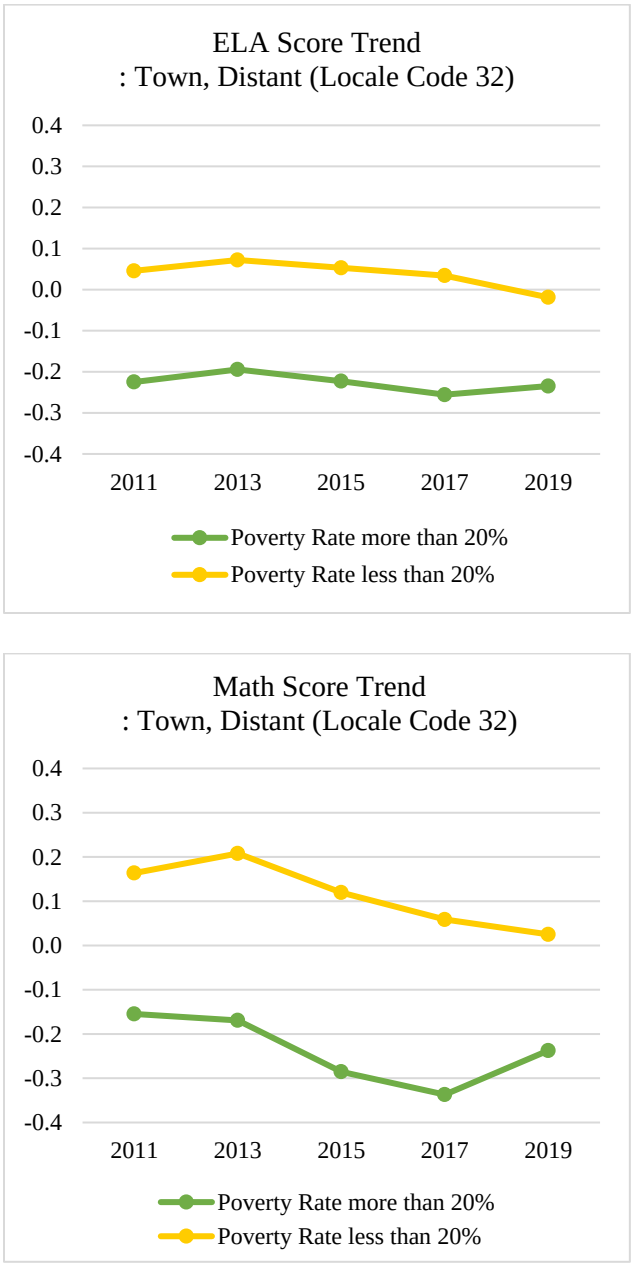
Figure 4.7 ELA and math score trends by locality within rural





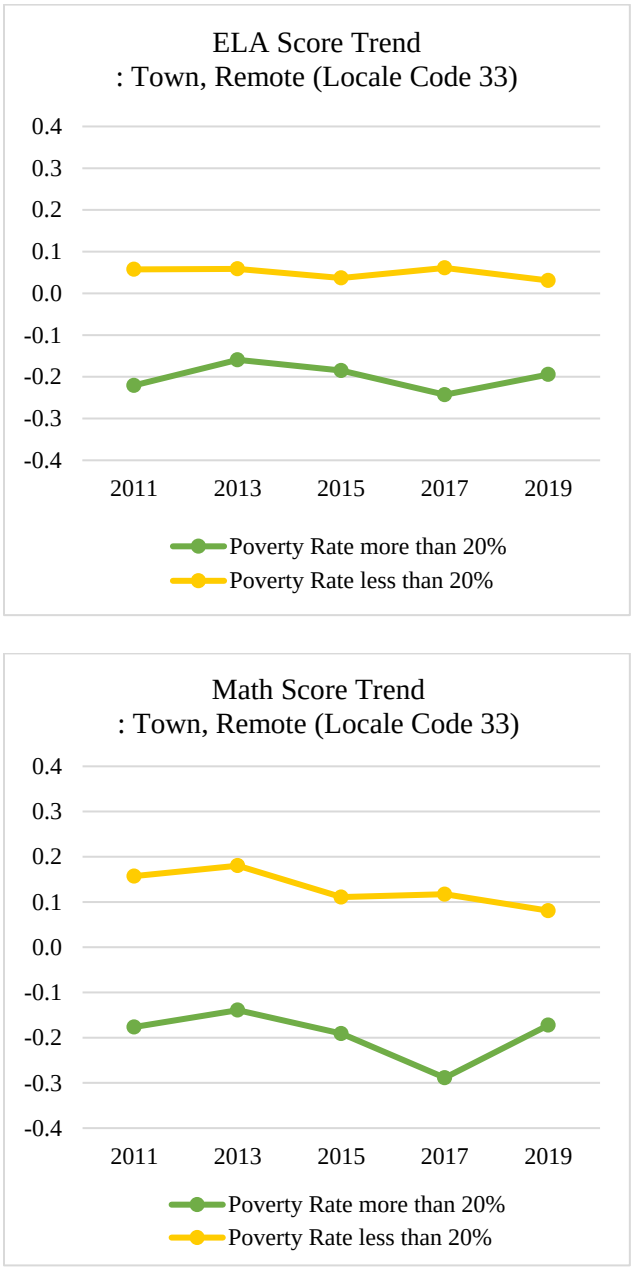
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.8 ELA and math scores trends in Distant Town (32) locality



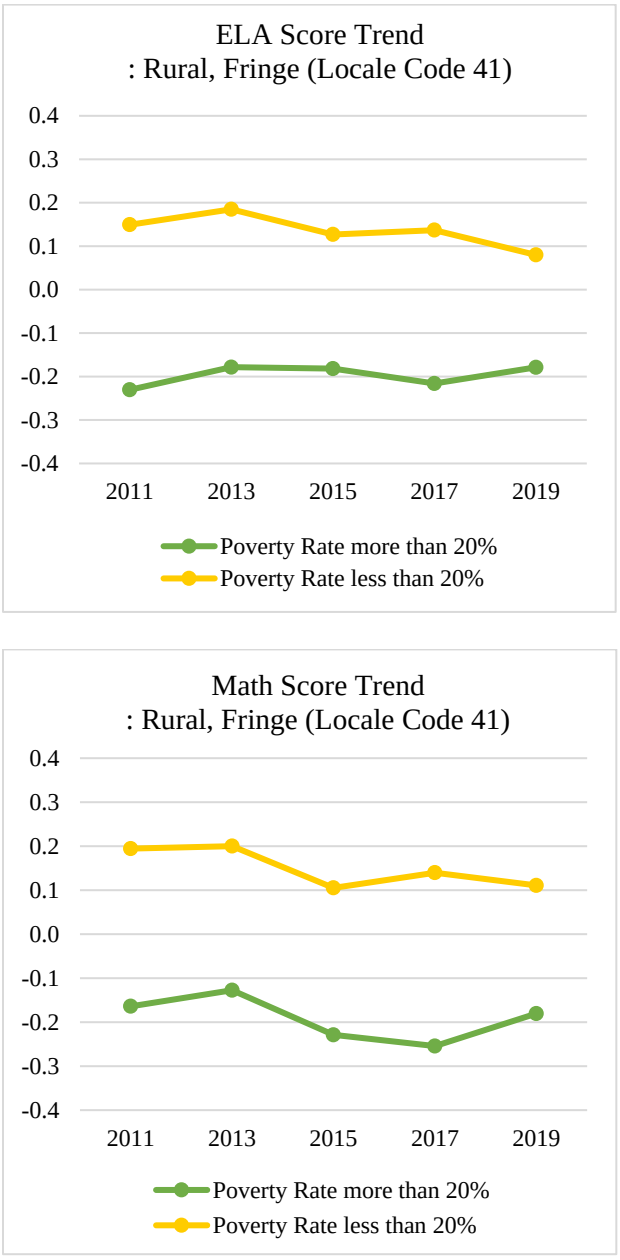
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.9 ELA and math scores trends in Remote Town (33) locality



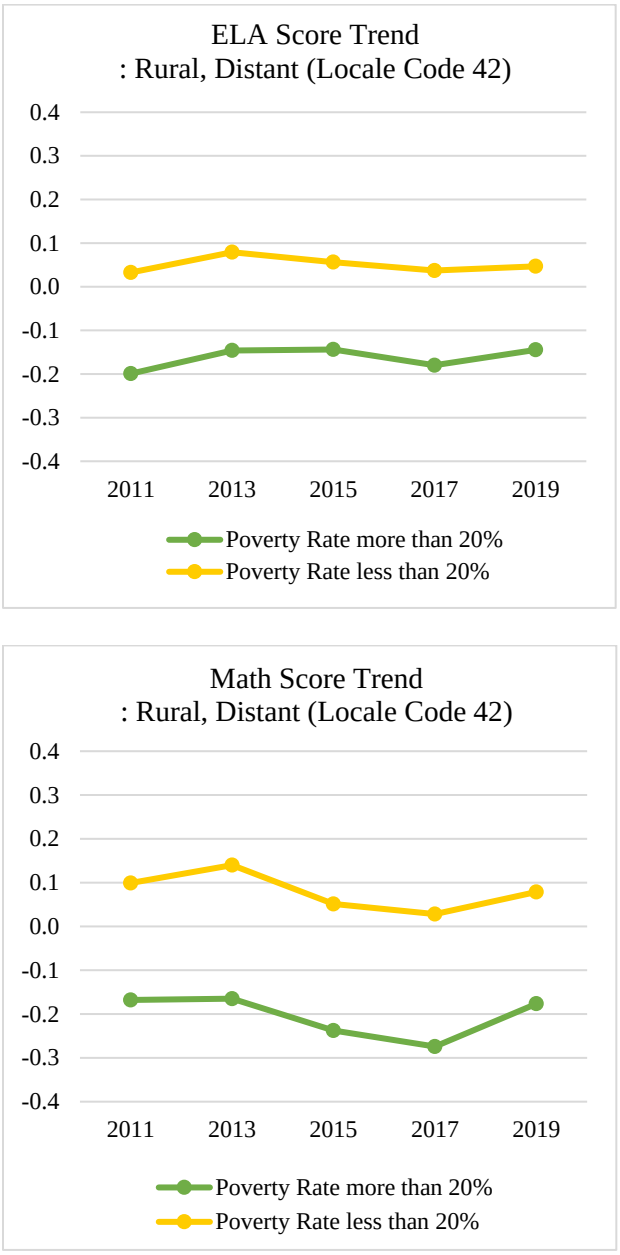
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.10 ELA and math scores trends in Rural Fringe (41) locality



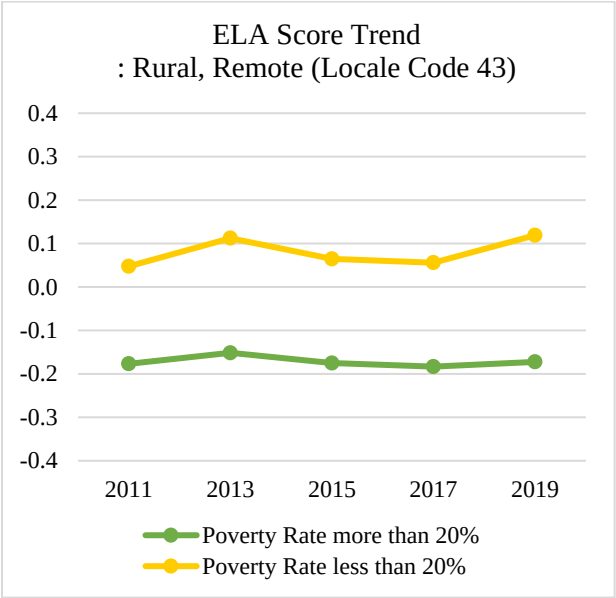
Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.11 ELA and math scores trends in Distant Rural (42) locality



Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.12 ELA and math scores trends in Remote Rural (43) locality



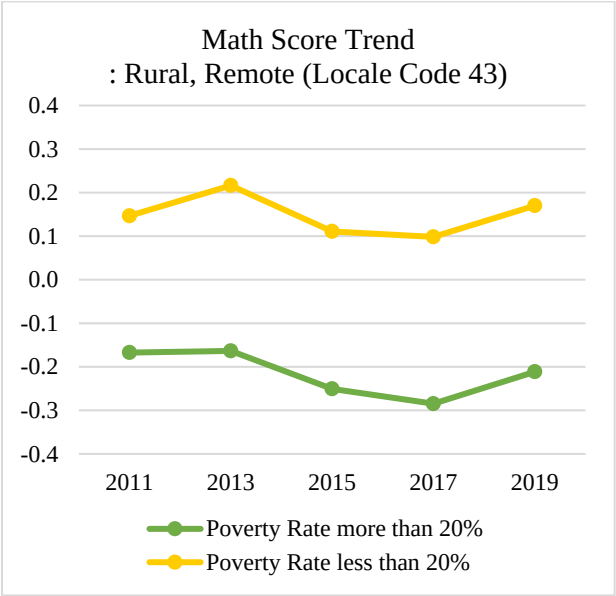
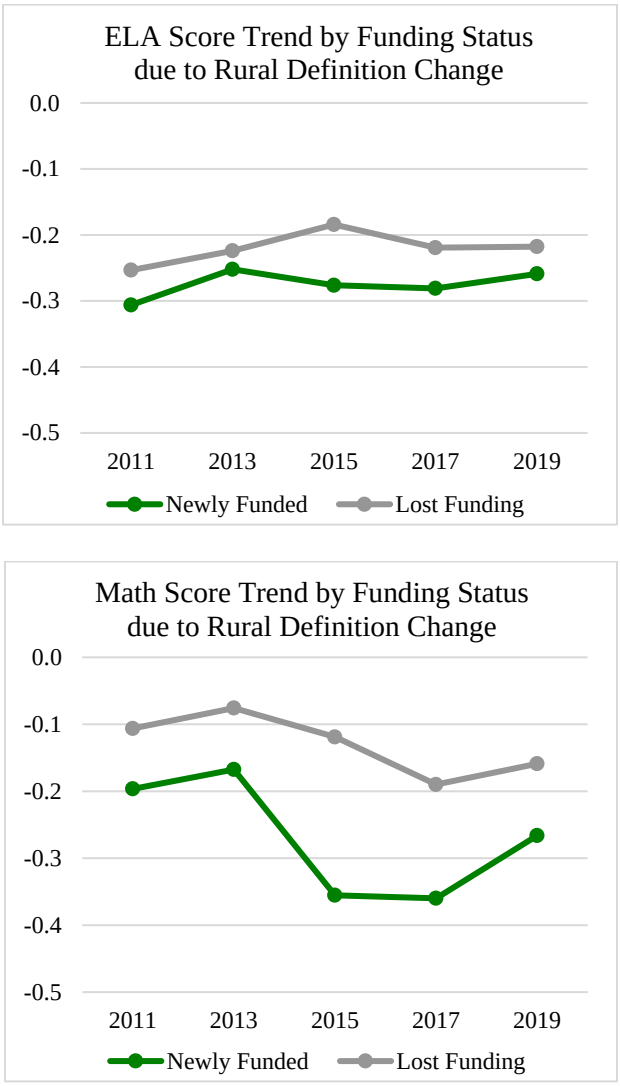
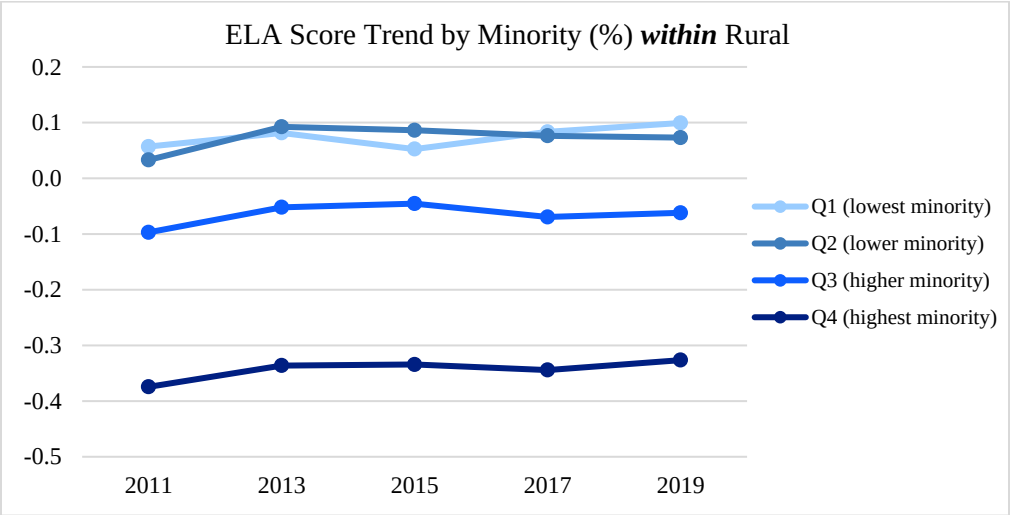


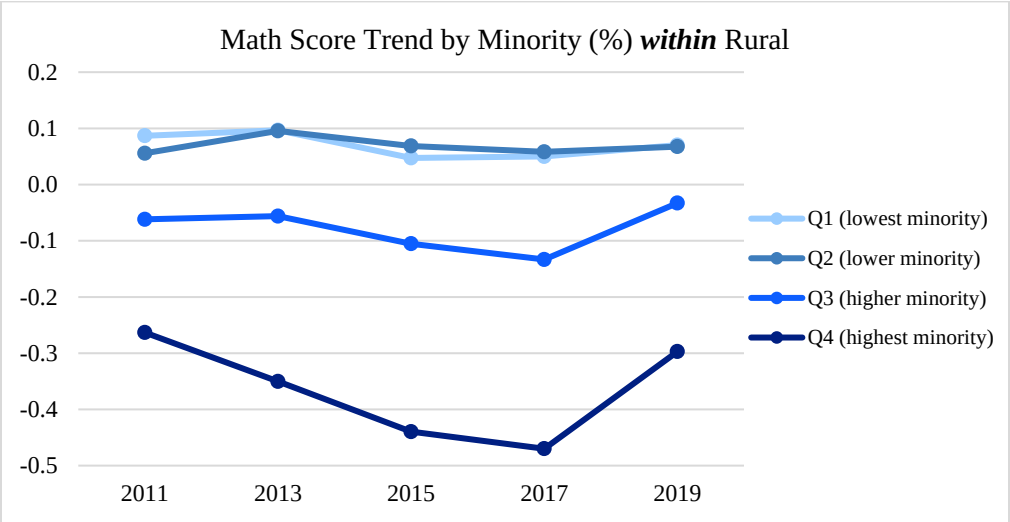
Figure 4.13 ELA and math score trends: newly funded (2018) vs. lost funding (2018)



Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

Figure 4.14 ELA and math score trends by minority student population within rural





Data source: NCES, U.S. Census Bureau, SEDA, OESE at the U.S. Department of Education. 2011-2019

CHAPTER 5. CONCLUSION

In my three descriptive studies, I attempt to provide a descriptive overview of rural education, specifically focused on federal rural funding policy changes in REAP grant program. The first paper centers on a fundamental question of how rural is defined. I compare rural and non-rural districts using two different federal definitions of 'rural' (the narrow and the broad definitions) used in REAP. In this study, I demonstrate that different rural definitions are associated with what a ‘representative rural school district’ looks like with diverse demographic/socio-economic characteristics and different levels of financial capability across the states depending on which definition is utilized.

The second paper explores how rural district funding level changes depending on which definition is applied and which localities are highlighted. I demonstrate that the new REAP policy changes increased the number of poor rural districts receiving financial grants and allowed school districts to make more autonomous financial decisions at a local level.

Lastly, the third paper illustrates how new REAP policy change implementation could possibly be associated with student achievement historical trends between rural and non-rural school districts and the variations within rural districts by their poverty level, locale codes, and minority concentration. The study shows that notable changes in student test scores are observed in the trend aligning with the REAP funding policy changes. While non-rural districts have higher test scores than rural districts in general, rural districts with a disadvantaged student population (high poverty, high minority) exhibit significant improvement in their academic outcomes coinciding with the policy changes.

There are many unexplored questions remaining that require further investigation for future research in rural education. As new REAP policy changes were implemented in

2018, more years of district funding amount and eligibility data are needed to document the financial support system for rural districts. A more comprehensive, systemic tracking of REAP district funding status (funding eligibility and actual amount) at the state level as well as federal level may help improve the access to more informed data for researchers. My analysis finds that different localities defined by locale codes show diverse levels of student achievement that could be further explored.

As Loeb et al. (2017) stated, descriptive analysis in these studies provides an outlook on the general landscape of a population of interests (i.e., rural school districts) and reveals hidden patterns in rural student academic outcomes in large-scale datasets. Since descriptive analysis can be an effective instrument to communicate with a broader audience, not only aiming for researchers but also teachers, administrators, and policymakers, practitioners who are not familiar with advanced econometric methodologies could find descriptive studies interesting and easy to understand. I hope the findings from my descriptive studies could provide a groundwork for future research in rural education to find the causal impact of REAP policy changes on rural school districts.

APPENDICES

APPENDIX 1. APPENDICES FOR CHAPTER 2

APPENDIX 1.1 U.S. CENSUS BUREAU CITY LOCALITY DISTRICT CHARACTERISTICS

Variables	Large City (11)			Midsize City (12)			Small City (13)		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
District student/teacher/staff characteristic									
Number of schools within a district	53.82	23.00	76.72	33.72	33.00	19.92	16.54	14.00	10.78
Number of students (1000)	33.6	16.6	50.64	19.7	19.9	11.77	9.2	7.4	7.15
Number of full-time teachers (1000)	1.885	0.794	2.70	1.178	1.076	0.82	0.554	0.464	0.44
Number of resource staff (1000)	0.214	0.083	0.39	0.159	0.106	0.20	0.071	0.042	0.10
Number of admin. staff (1000)	1.297	0.602	1.78	0.795	0.675	0.65	0.365	0.289	0.32
District demographic/socioeconomic characteristics									
Free and Reduced Lunch (%)	0.63	0.69	0.24	0.59	0.62	0.22	0.56	0.58	0.21
Poverty rate (%)	0.24	0.24	0.12	0.22	0.21	0.11	0.22	0.21	0.10
Minority*(%)	0.64	0.68	0.26	0.56	0.57	0.25	0.41	0.36	0.26
Education attainment† (%)	0.29	0.27	0.15	0.31	0.27	0.15	0.29	0.25	0.14
Unemployment rate$^{\phi}$ (%)	0.09	0.08	0.03	0.09	0.08	0.03	0.09	0.08	0.03
Median house income ($1000)	59.868	54.392	23.22	59.141	53.048	21.13	53.594	49.012	18.75
District Finance									
Revenue per pupil ($1000)									
Total revenue	13.456	12.196	5.15	13.459	12.475	4.37	14.309	13.111	4.55
Federal revenue	1.620	1.348	1.41	1.384	1.262	0.73	1.320	1.178	0.74
State revenue	6.041	5.335	3.69	6.372	5.794	3.27	6.678	6.172	3.27
Local revenue	5.795	4.854	4.10	5.703	4.720	3.86	6.312	5.299	3.93
Title I revenue	0.411	0.313	0.38	0.366	0.302	0.28	0.354	0.290	0.28
State formula assistance revenue	4.652	4.325	2.70	4.577	4.456	2.50	4.698	4.568	2.62
Spending per pupil ($1000)									
Total spending	13.545	12.276	5.07	13.537	12.483	4.52	14.336	13.121	4.72
Instructional spending	6.361	6.095	1.67	6.853	6.416	1.98	7.411	6.799	2.31
Transportation spending	0.381	0.277	0.31	0.418	0.348	0.32	0.467	0.402	0.32

* *Minority=Hispanic, Black, Native American students.*

† *Bachelor's Degree or higher for 25 and older.* $^{\phi}$ *for 16 and older.*

APPENDIX 1.2 U.S. CENSUS BUREAU SUBURBAN LOCALITY DISTRICT CHARACTERISTICS

Variables	Suburban Large			Suburban Midsize			Suburban Small		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
District student/teacher/staff characteristic									
Number of schools within a district	10.90	6.00	23.39	9.98	6.00	13.85	7.68	5.00	8.35
Number of students (1000)	7.1	3.3	16.95	5.5	3.1	8.25	4.1	2.4	5.40
Number of full-time teachers (1000)	0.421	0.208	1.03	0.332	0.196	0.54	0.237	0.131	0.32
Number of resource staff (1000)	0.051	0.018	0.15	0.042	0.017	0.08	0.029	0.012	0.06
Number of admin. staff (1000)	0.285	0.124	0.74	0.212	0.119	0.36	0.164	0.091	0.22
District demographic/socioeconomic characteristics									
Free and Reduced Lunch (%)	0.37	0.31	0.26	0.43	0.40	0.23	0.47	0.46	0.20
Poverty rate (%)	0.13	0.10	0.09	0.16	0.14	0.09	0.17	0.16	0.09
Minority*(%)	0.29	0.18	0.28	0.24	0.14	0.25	0.21	0.09	0.24
Education attainment† (%)	0.36	0.33	0.17	0.27	0.25	0.13	0.24	0.22	0.12
Unemployment rate$^{\phi}$ (%)	0.07	0.07	0.03	0.08	0.07	0.03	0.08	0.07	0.03
Median house income ($1000)	79.527	74.090	30.04	64.522	61.940	19.65	59.052	57.401	16.56
District Finance									
Revenue per pupil ($1000)									
Total revenue	17.581	16.436	7.93	14.723	13.002	6.80	13.836	12.696	4.61
Federal revenue	0.846	0.665	0.69	0.943	0.809	0.64	1.001	0.868	0.79
State revenue	6.074	5.554	3.35	6.357	6.223	2.67	6.510	6.304	2.59
Local revenue	10.661	9.498	7.95	7.423	5.362	6.93	6.325	5.382	4.49
Title I revenue	0.194	0.119	0.27	0.207	0.157	0.18	0.246	0.200	0.20
State formula assistance revenue	3.687	3.515	2.80	4.396	4.528	2.34	4.639	4.635	2.20
Spending per pupil ($1000)									
Total spending	17.358	16.124	7.98	14.609	12.873	6.79	13.779	12.567	4.77
Instructional spending	8.982	8.261	3.71	7.531	6.529	3.10	7.185	6.518	2.39
Transportation spending	0.641	0.540	0.77	0.504	0.463	0.31	0.494	0.453	0.29

** Minority=Hispanic, Black, Native American students.*

† Bachelor's Degree or higher for 25 and older. $^{\phi}$ for 16 and older.

APPENDIX 1.3 U.S. CENSUS BUREAU SUBURBAN LOCALITY DISTRICT CHARACTERISTICS

Variables	Town - Fringe			Town - Distant			Town - Remote		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
District student/teacher/staff characteristic									
Number of schools within a district	5.31	4.00	3.80	5.77	5.00	3.95	5.77	5.00	3.91
Number of students (1000)	2.5	1.9	2.08	2.5	1.9	2.03	2.2	1.5	1.93
Number of full-time teachers (1000)	0.147	0.118	0.12	0.153	0.120	0.13	0.140	0.102	0.12
Number of resource staff (1000)	0.019	0.010	0.03	0.020	0.011	0.03	0.018	0.009	0.03
Number of admin. staff (1000)	0.104	0.077	0.09	0.110	0.083	0.10	0.093	0.064	0.09
District demographic/socioeconomic characteristics									
Free and Reduced Lunch (%)	0.45	0.43	0.21	0.55	0.55	0.18	0.59	0.58	0.18
Poverty rate (%)	0.16	0.14	0.09	0.21	0.20	0.09	0.23	0.22	0.10
Minority*(%)	0.21	0.10	0.25	0.25	0.13	0.26	0.31	0.20	0.29
Education attainment† (%)	0.23	0.21	0.10	0.18	0.17	0.08	0.19	0.18	0.08
Unemployment rate$^{\phi}$ (%)	0.07	0.07	0.03	0.08	0.08	0.03	0.07	0.07	0.03
Median house income ($1000)	60.921	59.568	15.56	49.351	48.069	11.25	45.812	45.227	9.86
District Finance									
Revenue per pupil ($1000)									
Total revenue	14.558	12.918	5.93	13.188	12.259	4.24	12.746	11.942	4.07
Federal revenue	0.986	0.791	0.89	1.214	1.082	0.64	1.364	1.210	0.75
State revenue	6.975	6.705	2.84	6.715	6.414	2.65	6.342	6.010	2.65
Local revenue	6.597	5.157	5.66	5.259	4.509	3.81	5.039	4.141	4.09
Title I revenue	0.220	0.167	0.20	0.312	0.263	0.23	0.364	0.303	0.26
State formula assistance revenue	5.101	5.157	2.19	5.026	4.999	2.02	4.870	4.717	2.10
Spending per pupil ($1000)									
Total spending	14.550	12.582	6.26	13.137	11.952	4.58	12.766	11.695	4.59
Instructional spending	7.408	6.381	3.12	6.756	6.271	2.18	6.518	6.238	1.65
Transportation spending	0.557	0.467	0.36	0.498	0.441	0.29	0.432	0.389	0.23

** Minority=Hispanic, Black, Native American students.*

† Bachelor's Degree or higher for 25 and older. $^{\phi}$ for 16 and older.

APPENDIX 1.4 U.S. CENSUS BUREAU SUBURBAN LOCALITY DISTRICT CHARACTERISTICS

Variables	Rural - Fringe			Rural - Distant			Rural - Remote		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
District student/teacher/staff characteristic									
Number of schools within a district	5.44	4.00	6.36	3.25	3.00	2.85	2.61	2.00	1.56
Number of students (1000)	2.7	1.4	4.29	1.0	0.6	1.37	0.4	0.3	0.49
Number of full-time teachers (1000)	0.168	0.093	0.27	0.066	0.043	0.09	0.034	0.025	0.03
Number of resource staff (1000)	0.020	0.008	0.04	0.008	0.004	0.02	0.004	0.002	0.01
Number of admin. staff (1000)	0.118	0.063	0.18	0.048	0.028	0.07	0.023	0.016	0.03
District demographic/socioeconomic characteristics									
Free and Reduced Lunch (%)	0.45	0.44	0.23	0.51	0.49	0.19	0.55	0.54	0.18
Poverty rate (%)	0.17	0.15	0.10	0.18	0.17	0.08	0.21	0.19	0.10
Minority*(%)	0.20	0.09	0.24	0.15	0.06	0.20	0.18	0.08	0.22
Education attainment† (%)	0.23	0.20	0.12	0.18	0.16	0.07	0.18	0.18	0.06
Unemployment rate$^{\phi}$ (%)	0.07	0.07	0.03	0.07	0.07	0.02	0.06	0.06	0.02
Median house income ($1000)	62.115	58.053	21.51	54.137	53.176	11.87	47.798	47.381	9.34
District Finance									
Revenue per pupil ($1000)									
Total revenue	14.617	12.543	7.91	14.647	12.962	6.47	17.243	14.662	11.24
Federal revenue	1.029	0.878	0.75	1.171	0.991	0.93	1.463	1.182	1.74
State revenue	6.574	6.209	3.18	7.122	6.566	3.73	7.533	6.612	5.76
Local revenue	7.014	5.153	7.48	6.355	5.047	5.43	8.247	6.076	9.74
Title I revenue	0.241	0.184	0.29	0.289	0.226	0.31	0.378	0.287	0.77
State formula assistance revenue	4.705	4.749	2.36	5.351	5.183	2.86	5.576	4.963	4.27
Spending per pupil ($1000)									
Total spending	14.367	12.186	7.65	14.461	12.522	6.96	17.145	14.368	12.05
Instructional spending	7.303	6.292	3.47	7.261	6.496	2.98	8.235	7.412	3.83
Transportation spending	0.655	0.540	0.65	0.685	0.580	0.49	0.803	0.642	0.68

** Minority=Hispanic, Black, Native American students.*

† Bachelor's Degree or higher for 25 and older. $^{\phi}$ for 16 and older.

APPENDIX 2. APPENDICES FOR CHAPTER 3

APPENDIX 2.1 U.S. CENSUS BUREAU DEFINED AREA/LOCALE CODE CLASSIFICATIONS AND CRITERIA

Area	Locale Codes	Code Name	Descriptions
City	11	City, Large	Territory inside an Urbanized Area and inside a Principal City with a population of 250,000 or more.
	12	City, Midsize	Territory inside an Urbanized Area and inside a Principal City with a population less than 250,000 and greater than or equal to 100,000.
	13	City, Small	Territory inside an Urbanized Area and inside a Principal City with a population of less than 100,000.
Suburban	21	Suburban, Large	Territory outside a Principal City and inside an Urbanized Area with a population of 250,000 or more.
	22	Suburban, Midsize	Territory outside a Principal City and inside an Urbanized Area with a population less than 250,000 and greater than or equal to 100,000.
	23	Suburban, Small	Territory outside a Principal City and inside an Urbanized Area with a population of less than 100,000.
Town	31	Town, Fringe	Territory inside an Urban Cluster that is less than or equal to 10 miles from an Urbanized Area.
	32	Town, Distant	Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
	33	Town, Remote	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
Rural	41	Rural, Fringe	A census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
	42	Rural, Distant	A census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
	43	Rural, Remote	A census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Data source: NCES Locale Classifications (https://nces.ed.gov/programs/edge/Geographic/LocaleBoundaries)

APPENDIX 2.2 U.S. CONGRESSIONAL LETTER TO U.S. DEPARTMENT OF EDUCATION REGARDING REAP

United States Senate
WASHINGTON, DC 20510

March 4, 2020

The Honorable Betsy DeVos
Secretary
United States Department of Education
400 Maryland Avenue, SW
Washington, DC 20202-8510

Dear Secretary DeVos:

We write to express our strong opposition to the Department of Education's decision to change the eligibility methodology for the Rural Low-Income Schools Program. According to the Department's own projections, this change, which is being implemented without notice to Congress and after funding for fiscal year (FY) 2020 has already been appropriated, is expected to exclude more than 800 rural, low-income schools from eligibility nationwide this year. We urge the Department to prevent these cuts from taking effect.

The Rural Education Achievement Program (REAP), authored by Senator Susan Collins and former Senator Kent Conrad, is the only dedicated federal funding stream to help rural schools overcome the increased expenses caused by geographic isolation. It consists of two programs – the Small, Rural School Achievement (SRSA) program and the Rural and Low-Income Schools (RLIS) program. Rural school districts frequently lack the resources and staff needed to compete effectively for federal grants, and often receive formula grant allocations too small to be effective. Since 2002, rural schools across the nation have relied on these additional flexible funds to purchase supplies and make technology upgrades; expand curricular offerings, such as in reading, physical education, music, and art; provide distance learning opportunities; fund transportation; and support professional development activities. Without any chance to prepare, this abrupt change in RLIS eligibility will force many rural school districts to forgo essential activities and services.

The RLIS program targets funding to rural, high-poverty schools. In 2003, one year after the law was enacted, the Department advised states that, if Census poverty data for a school district did not exist, the state could "provide the U.S. Department of Education with the adjusted poverty data that it uses to make its allocations to Local Education Agencies (LEAs) under Part A of Title I to determine the eligibility of LEAs for which Census poverty estimates are not available."[1] Since that time, the Department has continued to accept an alternative poverty measurement for allocating RLIS funding, without interruption or revised guidance. For many rural school districts, standard measures of neighborhood poverty, including those collected the U.S. Census Bureau's Small Area Income and Poverty Estimates (SAIPE), is unavailable or undercounts the number of economically disadvantaged students. Many states have instead relied on annual, local data collected through participation in the Free and Reduced-Price Lunch program. This is a widely-used, comprehensive measure of poverty in schools. In fact, federal funding allocated under Title I Part A of the Elementary and Secondary Education Act permits small school districts to submit an alternative poverty measurement for the Department's distribution of funds to those districts. Yet under the Department's change, even school districts that are not using alternative poverty measurements are seeing dramatic swings in funding due to

[1] Appendix E, *Guidance on the Rural Education Achievement Program (REAP)*, U.S. Department of Education, June 2003.

the limitations of the SAIPE data. The sharp eligibility disparities and funding cuts illustrate the serious deficiencies in relying on the SAIPE data alone to implement the RLIS program.

In 2015, Congress reauthorized REAP through the bipartisan Every Student Succeeds Act (ESSA). Predicting some adjustments, Congress included a hold harmless provision to ease the transition for schools in the SRSA program. The Department appears to have had no difficulty implementing the REAP improvements, particularly with respect to dual-eligibility, and it continued to accept alternate poverty data for the RLIS program. At no time during the ESSA transition did the Department notify Congress or states that the RLIS program would be administered differently. It continued to accept alternative poverty measurements, including those based on free and reduced-price lunch, and states reasonably relied on its past practices and consistent approvals to do the same. Additionally, Congress relied on the technical expertise of the Department and this eligibility issue was never brought to our attention. It is puzzling that the Department has now, 18 years after REAP's creation and more than four years after its reauthorization, chosen to implement the law differently and without any notice to Congress.

Additionally, ESSA provides the Secretary with the authority to "take such steps as are necessary to provide for the orderly transition" to the law's requirements.[2] The Department identified several requirements over which it would exercise flexibility, but it never identified methodological changes to the RLIS program. The Department should once again rely on the its "orderly transition" authority to prevent an implementation change from taking effect, and thus avoid the severe eligibility and funding reductions it is proposing for this year.

We are also alarmed that the Department did not provide Congress, states, and school districts with any notice about its decision to use a new methodology prior to or along with submitting its budget request for REAP in FY 2020. In fact, the FY 2020 request expressed continued support for dividing equally the funds appropriated to both SRSA and RLIS. Thus, Congress rightly expected the Department to administer RLIS consistent with past practices. Today's after-the-fact change, however, places RLIS grantees in jeopardy and will put additional strain on the SRSA program. School districts that, previously, may have been eligible to choose either SRSA or RLIS may find themselves only eligible for SRSA, which are likely to reduce the value of awards in that crucial program. The Department's decision has created a funding cliff for hundreds of rural, low-income schools that are already balancing tight budgets. We also note that the Department's FY 2021 budget request includes no mention of any methodological changes to the REAP grants.

REAP helps deliver an equitable and enriching education to thousands of students living in rural America. We strongly encourage you to rescind this new interpretation and to work with Congress to serve students in rural communities. We look forward to working with you on this important issue and request an immediate response.

Sincerely,

Susan M. Collins
United States Senator

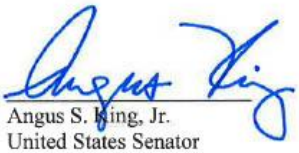
Margaret Wood Hassan
United States Senator

[2] PL 114-95 §4(b)

Lamar Alexander
United States Senator

Jon Tester
United States Senator

Steve Daines
United States Senator



Angus S. King, Jr.
United States Senator

Pat Roberts
United States Senator

Jeanne Shaheen
United States Senator

Chuck Grassley
United States Senator

Gary C. Peters
United States Senator

James M. Inhofe
United States Senator

Tim Kaine
United States Senator

Cory Gardner
United States Senator

Dianne Feinstein
United States Senator

Todd Young
United States Senator

Mark R. Warner
United States Senator

Cindy Hyde-Smith
United States Senator

Joni K. Ernst
United States Senator

James Lankford
United States Senator

Mitch McConnell
United States Senator

Mike Braun
United States Senator

John Cornyn
United States Senator

APPENDIX 2.3 KOLMOGOROV–SMIRNOV (K-S) TEST RESULT INTERPRETATION

The K-S test was performed to compare two sample distributions to each other. K-S test can identify patterns that cannot be distinguished with a Student's T-Test by detecting the variance when the sample mean, and the standard deviation is very similar.

- Example: Comparing the RLIS 2017 recipients and the RLIS 2018 recipients on district total revenue per pupil ($1000)
- Two-sample Kolmogorov-Smirnov test for equality of distribution functions

Smaller group	D	p-value
0:	0.1065	0.000
1:	-0.0021	0.991
Combined K-S	0.1065	0.000

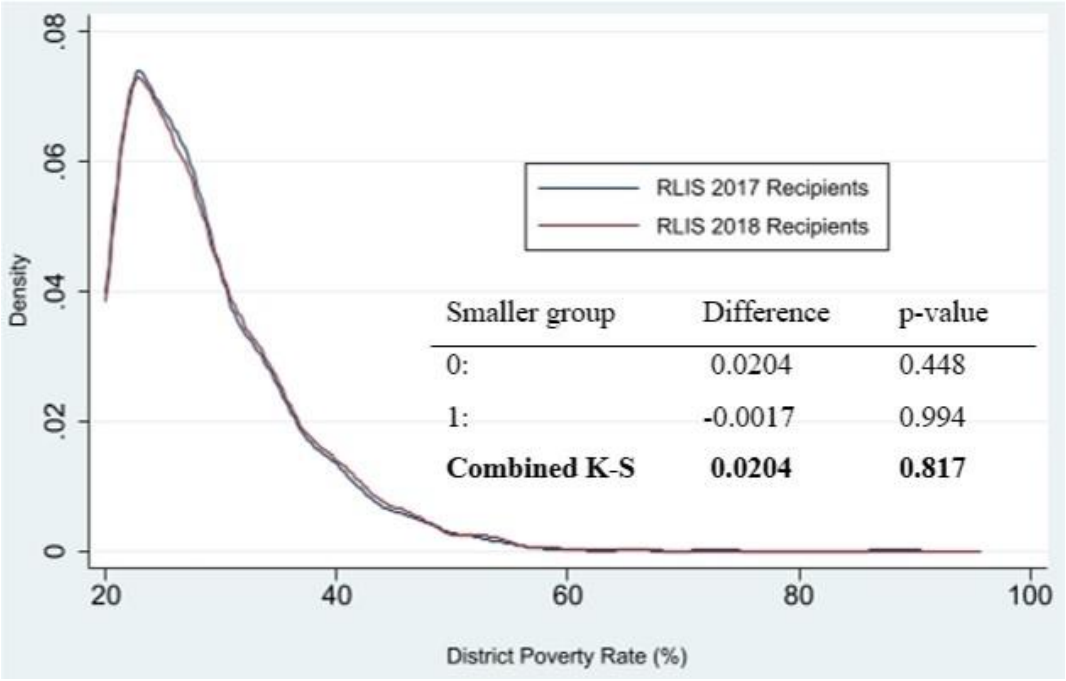
The first line tests the hypothesis that total revenue per pupil for RLIS 2017 recipients contains smaller values than for RLIS 2018 recipients. The largest difference between the distribution functions is 0.1065. The approximate p-value for this is 0.000, which is significant.

The second line tests the hypothesis that total revenue per pupil for RLIS 2017 recipients contains larger values than for RLIS 2018 recipients. The largest difference between the distribution functions in this direction is 0.0021. The approximate p-value for this small difference is 0.991, which is not significant.

The Combined K–S statistic is the relevant one for the hypothesis of equal distributions between RLIS 2017 recipients and RLIS 2018 recipients and the approximate p-value for the combined test is 0.000, which we would reject the hypothesis. Therefore, we can say that comparing RLIS 2017 recipients and RLIS 2018 recipients, the two distributions on districts' total revenue per pupil have a statistically significant difference.

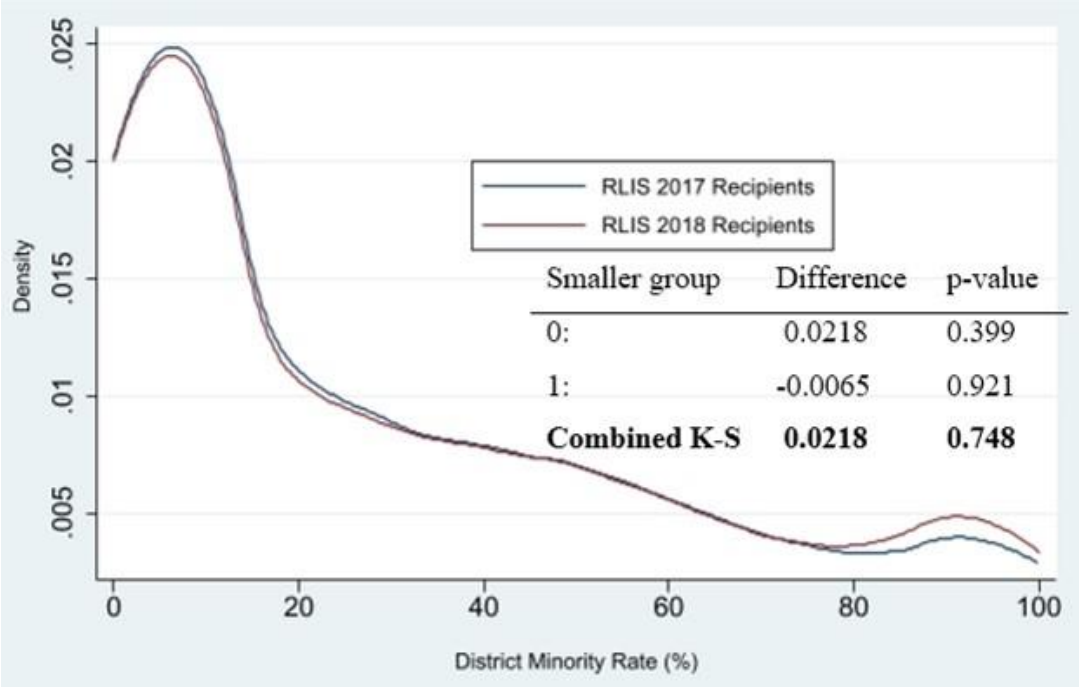
APPENDIX 2.4 K-S TEST RESULTS WITH NO STATISTICALLY SIGNIFICANT DIFFERENCES

Figure 3.12 RLIS Recipients District Poverty Rate Comparison: 2017 vs. 2018



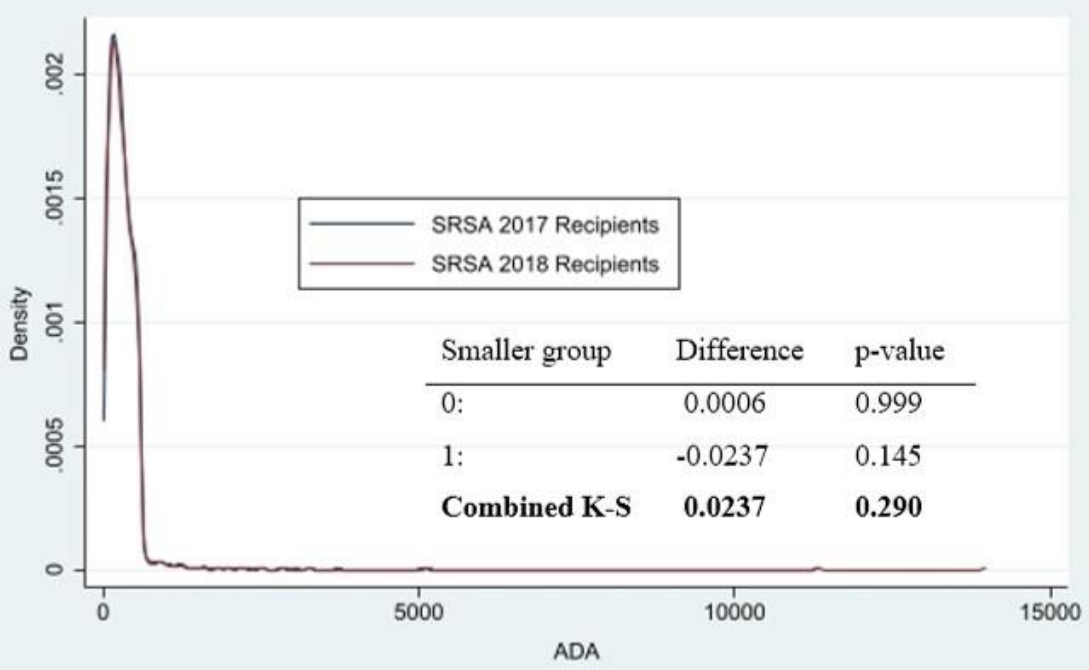
APPENDIX 2.4 K-S TEST RESULTS WITH NO STATISTICALLY SIGNIFICANT DIFFERENCES (CONTINUED)

Figure 3.13 RLIS Recipients District Minority Rate Comparison: 2017 vs. 2018



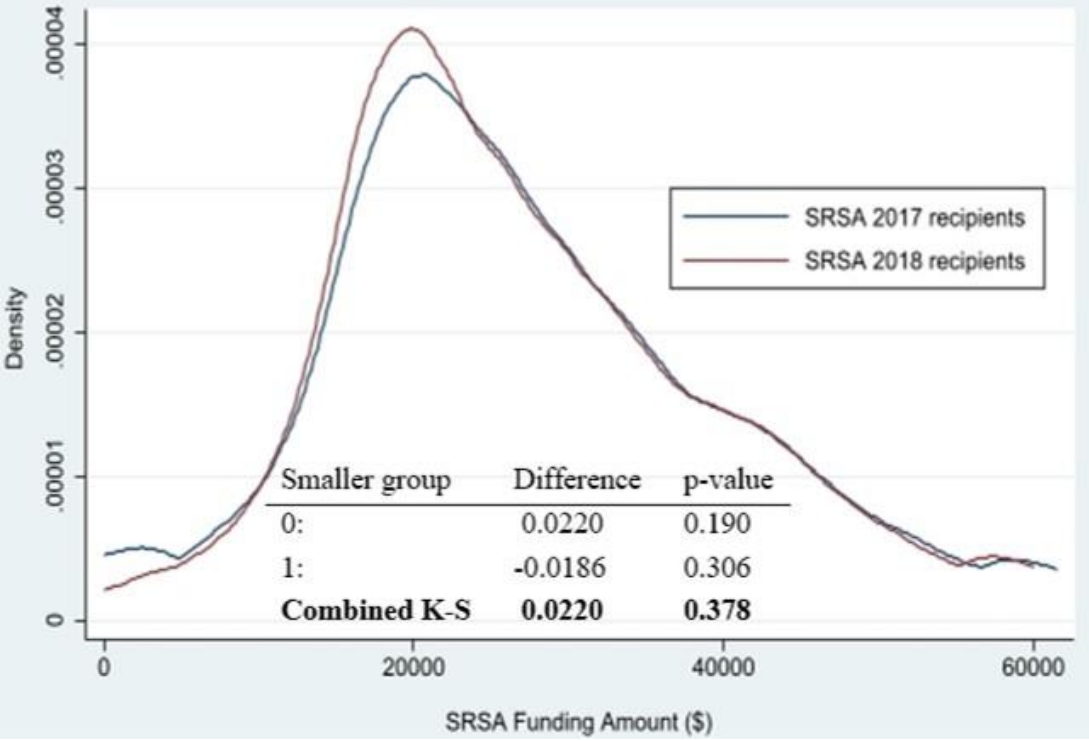
APPENDIX 2.4 K-S TEST RESULTS WITH NO STATISTICALLY SIGNIFICANT DIFFERENCES (CONTINUED)

Figure 3.14 SRSA Recipients ADA Comparison: 2017 vs. 2018



APPENDIX 2.4 K-S TEST RESULTS WITH NO STATISTICALLY SIGNIFICANT DIFFERENCES (CONTINUED)

Figure 3.15 SRSA Recipients SRSA Funding Amount Comparison: 2017 vs. 2018



REFERENCES

Aaronson, Daniel, Lisa Barrow, and William Sander. "Teachers and student achievement in the Chicago public high schools." *Journal of Labor Economics* 25, no. 1 (2007): 95-135.

AASA and The Rural School and Community Trust. (2017). *Leveling the Playing Field for Rural Students*.Washington, D.C.

Arnold, M. L., Newman, J. H., Gaddy, B. B., & Dean, C. B. (2005). A look at the condition of rural education research: Setting a difference for future research. Journal of Research in Rural Education, 20(6).

Bacolod, M., De la Roca, J., & Ferreyra, M. M. (2021). In search of better opportunities: Sorting and agglomeration effects among young college graduates in Colombia. *Regional Science and Urban Economics*, 87, 103656.

Baker, B. D., & Chingos, M. M. (2019). Toward a rich data future for school finance research. *AERA Open, 5(4),* 2332858419887735.

Barrett, N., Butler, J. S., & Toma, E. F. (2012). Do less effective teachers choose professional development does it matter? *Evaluation Review, 36,* 346-374.

Barrett, N., Cowen, J., Toma, E., & Troske, S. (2015). Working with what they have: Professional development as a reform strategy in rural schools. *Journal of Research in Rural Education, 30*(10), 1-18.

Broton, K., Mueller, D., Schultz, J. L., & Gaona, M. (2009). *Strategies for Rural Minnesota School Districts – A Literature Review*. Center for Rural Policy and Development.

Burton, M., Brown, K, & Johnson, A. (2013). Storylines about rural teachers in the United States: A narrative analysis of the literature. *Journal of Research in Rural Education*, *28*(12), 1-18.

Carnoy, M., & Loeb, S. (2002). Does external accountability affect student outcomes? A cross-state analysis. *Educational evaluation and policy analysis*, *24*(4), 305-331.

Casto, H. G. (2019). “We're nine miles from the board building, but the perception is that we're 100 miles away out in farm country”: The case of a rural school in a non-rural district. *Journal of Rural Studies, 72*, 164-173.

Center for Rural Pennsylvania. Retrieved from https://eric.ed.gov/?id=ED540876
Collins, L., & Lanza, S. (2010). Latent Class and Latent Transition Analysis. Hoboken NJ: John Wiley & Sons.

Collins, S. (2003, December 1). *Collins and Conrad Lead Bipartisan Call for Full Funding of Rural School Program* https://www.collins.senate.gov/newsroom/collins-and-conrad-lead-bipartisan-call-full-funding-rural-school-program

Collins, S. (2020, March 4). *Collins, Hassan Lead Bipartisan Group Urging Education Department to Protect Funding for More Than 800 Rural, Low-Income Schools.* U.S. Senator for Maine, Susan Collins' Homepage. https://www.collins.senate.gov/newsroom/collins-hassan-lead-bipartisan-group-urging-education-department-protect-funding-more-800

Combs, A. E., & Foster, J. M. (2021). The effects of homestead exemptions for seniors and disabled people on school districts. *AERA Open, 7,* 2332858420988712.

Combs, A., Foster, J., & Toma, E. F. (2019). Local Responses to School Finance Equalization: Wealth or Place? *Public Finance and Management, 18(3),* 224-250.

Cromartie, J., & Bucholtz, S. (2008). Defining the "rural" in rural America (No. 1490-2016-127511, pp. 28-35).

Cullen, J. B., Jacob, B. A., & Levitt, S. D. (2005). The impact of school choice on student outcomes: an analysis of the Chicago Public Schools. *Journal of Public Economics*, *89*(5-6), 729-760.

De Gregorio, S., Dhaliwal, T. K., Owens, A., & Painter, G. (2022). Timing and duration of student homelessness and educational outcomes in Los Angeles. *Educational Researcher*, *51*(6), 376-386.

DeYoung, A. J. (1987). The status of American rural education research: An integrated review and commentary. Review of Educational Research, 57(2), 123-148.

Dhaliwal, T. K., & Bruno, P. (2021). The rural/nonrural divide? K–12 district spending and implications of equity-based school funding. *AERA Open, 7,* 2332858420982549.

Dhaliwal, T. K., Lai, I., & Strunk, K. O. (2022). Round and Round They Go: The Relationship Between Changing Grades and Schools and Teacher Quality and Absence Rates. *Educational Evaluation and Policy Analysis,* 01623737221111800.

Dhaliwal, Tasminda K. and Bruno, Paul (2017). Break from the Past or More of the Same? Exploring the Impact of California's Local Control Funding Formula on School Districts. APPAM 2017 Conference Panel Discussion.

Dupéré, V., Dion, E., Leventhal, T., Crosnoe, R., Goulet, M., & Archambault, I. (2019). Circumstances preceding dropout among rural high school students: A comparison with urban peers. *Journal of Research in Rural Education, 35*(3), 1-20.

Fensterwald, J. (2016). Brown praises return to local control in State of the State. *EdSource*

Fowles, J., Butler, J. S., Cowen, J. M., Streams, M. E., & Toma, E. F. (2014). Public employee quality in a geographic context: A study of rural teachers. *The American Review of Public Administration, 44(5),* 503-521.

Gagnon, D. J., & Mattingly, M. J. (2015). State policy responses to ensuring excellent educators in rural schools. *Journal of Research in Rural Education, 30*(13), 1-14

Geverdt, D. (2019*). Education Demographic and Geographic Estimates Program (EDGE): Locale Boundaries File Documentation, 2017* (NCES 2018-115). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [April 18, 2023] from http://nces.ed.gov/pubsearch.

Glover, T. A., Nugent, G. C., Chumney, F. L., Ihlo, T., Shapiro, E. S., Guard, K., Koziol, N., & Bovaird, J. (2016). Investigating rural teachers' professional development, instructional knowledge, and classroom practice. *Journal of Research in Rural Education, 31*(3), 1-16.

Green, E. (2020, February 28). *Education Dept. to Cut Off Federal Funding for Some Rural Schools.* The New York Times. https://www.nytimes.com/2020/02/28/us/politics/rural-schools-funding-cut.html

Green, E. (2020, March 4). *Education Dept. Reverses Plan to Cut Rural School Funding.* The New York Times. https://www.nytimes.com/2020/03/04/us/politics/rural-schools-funding.html

Hansen, M., Backes, B., & Brady, V. (2016). Teacher attrition and mobility during the Teach for America clustering strategy in Miami-Dade County Public Schools. *Educational Evaluation and Policy Analysis, 38*(3), 495-516.

Hill H. (Guest). (2022, November 4). *Harvard EdCast: Making up the difference in math* [Audio podcast]. Retrieved from https://www.gse.harvard.edu/news/22/11/harvard-edcast-making-difference-math

Jacob, B. A. (2005). Accountability, incentives, and behavior: The impact of high-stakes testing in the Chicago Public Schools. *Journal of Public Economics, 89*(5-6), 761-796.

Jang, H., & Reardon, S. F. (2019). States as sites of educational (in) equality: State contexts and the socioeconomic achievement gradient. *AERA open, 5(3),* 2332858419872459.

Johnson, J. & Howley, C. B. (2015). Contemporary Federal Education Policy and Rural Schools: A Critical Policy Analysis, *Peabody Journal of Education, 90:2,* 224-241.

Johnson, J., Showalter, D., Klein, R., & Lester, C. (2014). Why Rural Matters 2013-2014: The Condition of Rural Education in the 50 States. *Rural School and Community Trust.*

Jordan, J. L., Kostandini, G., & Mykerezi, E. (2012). Rural and urban high school dropout rates: Are they different? *Journal of Research in Rural Education, 27(12),* 1-21.

Knight, D. S., & Mendoza, J. (2019). Does the measurement matter? Assessing alternate approaches to measuring state school finance equity for California's Local Control Funding Formula. *AERA Open, 5(3),* 2332858419877424.

Kolbe, T., Baker, B. D., Atchison, D., Levin, J., & Harris, P. (2021). The additional cost of operating rural schools: Evidence from Vermont. *AERA Open, 7,* 2332858420988868.

Koziol, N. A., Arthur, A. M., Hawley, L. R., Bovaird, J. A., Bash, K. L., McCormick, C., &Welch, G. W. (2015). Identifying, analyzing, and communicating rural: A quantitative perspective. *Journal of Research in Rural Education, 30*(4), 1-14.

Kuenzi, J. (2017). *The Rural Education Achievement Program: Title V B of the Elementary and Secondary Education Act.* Congressional Research Service R44906. https://crsreports.congress.gov

Ladd, H. F. (1999). The Dallas school accountability and incentive program: An evaluation of its impacts on student outcomes. *Economics of Education Review*, *18*(1), 1-16.

Leos-Urbel, J., Schwartz, A. E., Weinstein, M., & Corcoran, S. (2013). Not just for poor kids: The impact of universal free school breakfast on meal participation and student outcomes. *Economics of education review*, *36*, 88-107.

Lichter, D. T. (2012). Immigration and the new racial diversity in rural America. *Rural sociology*, *77*(1), 3-35.

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive Analysis in Education: A Guide for Researchers. NCEE 2017-4023. National Center for Education Evaluation and Regional Assistance.

Masumoto, M., & Brown-Welty, S. (2009). Case Study of Leadership Practices and School-Community Interrelationships in High-Performing, High-Poverty, Rural California High Schools. *Journal of Research in Rural Education, 24*(9).

Means, D. R. (2018). Supporting the Pathways to Postsecondary Education for Rural Students: Challenges, Opportunities, and Strategies for Moving Forward. *National Association for College Admission Counseling*.

Montgomery, M. R. (2010). Small Rural School Districts in Nebraska: A Case Study of Challenges and Solutions *Educational Administration: Theses, Dissertations, and Student Research*. 50.

Motoko Rich (2013, May 29). *In Raising Scores, 1 2 3 Is Easier Than A B C.* The New York Times. Retrieved from https://www.nytimes.com/2013/05/30/education/reading-gains-lag-improvements-in-math.html

National Association of State Boards of Education. (2016). *Educating Students in Rural America: Capitalizing on Strengths, Overcoming Barriers*. Alexandria, VA.

Nguyen, T. D. (2020). Examining the teacher labor market in different rural contexts: Variations by urbanity and rural states. *AERA Open, 6(4),* 2332858420966336.

Nguyen-Hoang, P. (2021). The fiscal effects of tax increment financing on rural school districts: The case of Iowa. *AERA open, 7,* 2332858421991149.

Nitta, K., Holley, M., & Wrobel, S. (2010). A phenomenological study of rural school consolidation. *Journal of Research in Rural Education,* 25(2), 1-19.

Oates, W. E. (1969). The effects of property taxes and local public spending on property values: An empirical study of tax capitalization and the Tiebout hypothesis. *Journal of political economy*, *77*(6), 957-971.

Oh, K. (2023). Diversity within rural school districts: a closer look at Rural Education Achievement Program (REAP) and its policy changes [Unpublished doctoral dissertation]. The University of Kentucky.

OMB Definitions of Rural https://www.hhs.gov/guidance/document/defining-rural-population

Prins, E., & Kassab, C. (2017). Rural/Non-rural differences among Pennsylvania FAFSA applicants pursuing the same type of postsecondary degree. *Journal of Research in Rural Education, 32*(7), 1-16.

Rauscher, E. (2020). Does money matter more in the country? Education funding reductions and achievement in Kansas, 2010–2018. *AERA open, 6(4),* 2332858420963685.

Rural Education Achievement Program. Office of Elementary and Secondary Education. (2020, December 14). Retrieved December 2022, from https://oese.ed.gov/offices/office-of-formula-grants/rural-insular-native-achievement-programs/rural-education-achievement-program/

Reardon, S. F., Fahle, E. M., Ho, A. D., Shear, B. R., Kalogrides, D., Saliba, J., & Kane, T.J. (2022). Stanford Education Data Archive (Version SEDA 2022). Retrieved from http://purl.stanford.edu/db586ns4974.

Reardon, S. F., Ho, A. D., Shear, B. R., Fahle, E. M., Kalogrides, D., Jang, H., & Chavez, B. (2021). Stanford Education Data Archive (Version 4.1). Retrieved from http://purl.stanford.edu/db586ns4974.

Riehl, E., & Welch, M. (2023). Accountability, test prep incentives, and the design of math and English exams. *Journal of Policy Analysis and Management, 42(1),* 60-96.

Rosenberg, L., Christianson, M. D., Angus, M. H., & Rosenthal, E. (2014). *A Focused Look at Rural Schools Receiving School Improvement Grants*.

Rubenstein, R. (1998). Resource equity in the Chicago Public Schools: A school-level approach. *Journal of Education Finance, 23*(4), 468-489.

Rural Schools Association of New York State. (2017). *Rust, Renaissance or Revolt: The State of New York's Rural Schools: Guide to Improving Rural Schools, 2017 Legislative Priorities*.

Schmitt-Wilson, S., Downey, J., & Beck, A.E. (2018). Rural educational attainment: The importance of Context. *Journal of Research in Rural Education, 33*(1), 1-14.

Shores, K., & Steinberg, M. P. (2019). Schooling during the Great Recession: Patterns of school spending and student achievement using population data. *AERA Open, 5(3),* 2332858419877431.

Showalter, D., Hartman, S. L., Johnson, J., & Klein, B. (2019). Why Rural Matters 2018-2019: The Time Is Now. A Report of the Rural School and Community Trust. *Rural School and Community Trust.*

Showalter, D., Klein, R., Johnson, J., & Hartman, S. L. (2017). Why Rural Matters 2015-16: Understanding the Changing Landscape. A Report of the Rural School and Community Trust Policy Program. *Rural School and Community Trust*.

Sipple, J. W., & Brent, B. O. (2014). Challenges and opportunities associated with rural school settings. In H. F. Ladd & M. E. Goertz (Eds.), *Handbook of research in education finance and policy* (pp. 612–629). Routledge.

Sipple, J., & Brent, B. O. (2015). Challenges and Strategies Associated with Rural School Settings. In H. F. Ladd & M. E. Goertz (Eds.), *Handbook of Research in Education Finance and Policy: 2nd Edition*. Routledge.

Sosina, V. E., & Weathers, E. S. (2019). Pathways to inequality: Between-district segregation and racial disparities in school district expenditures. *AERA open, 5(3),* 2332858419872445.

Stair, A., Rephann, T. J., & Heberling, M. (2006). Demand for public education: Evidence from a rural school district. *Economics of Education Review, 25(5),* 521-531

Stoddard, C., & Toma, E. F. (2021). Introduction to special topic: Rural education finance and policy. AERA Open, 7, 23328584211011607.

Strunk, K. O., Marsh, J. A., Hashim, A. K., Bush-Mecenas, S., & Weinstein, T. (2016). The impact of turnaround reform on student outcomes: Evidence and insights from the Los Angeles Unified School District. *Education Finance and Policy*, *11*(3), 251-282.

Surface, J. L., "The Rural School Leadership Dilemma" (2014). *Publications of the Rural Futures Institute*.

Thier, M., Longhurst, J. M., Grant, P. D., & Hocking, J. E. (2021). Research deserts: A systematic mapping review of U.S. rural education definitions and geographies. Journal of Research in Rural Education, 37(2)

Tholkes, R. J. (1991). Economies of Scale in Rural School District Reorganization. *Journal of Education Finance*, *16*(Spring), 497–514.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Common Core Database. https://nces.ed.gov/ccd

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of political economy*, *64*(5), 416-424.

U.S. Senate Committee on Health, Education, Labor, and Pensions (2015). *The Every Child Achieves Act of 2015*. https://www.help.senate.gov/imo/media/The_Every_Child_Achieves_Act_of_2015--summary.pdf

USDA Rural Definition Classifications https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/

Wargo, E. S., & Simmons, J. (2021). Technology storylines: A narrative analysis of the rural education research. *The Rural Educator*, *42*(2), 35-50.

Williams, S. M., Swain, W. A., & Graham, J. A. (2021). Race, climate, and turnover: An examination of the teacher labor market in rural Georgia. *AERA Open, 7,* 2332858421995514.

Yan, W. (2009). *Rural School District Enrollment and Building Capacity: Projections for the Next 10 Years*.

Yang, M., Lee, S. W., & Goff, P. T. (2021). Labor dynamics of school principals in rural contexts. *AERA Open, 7*, 2332858420986189.

Yettick, H., Baker, R., Wickersham, M., & Hupfeld, K. (2014). Rural districts left behind? Rural districts and the challenges of administering the Elementary and Secondary Education Act. *Journal of Research in Rural Education, 29*(13), 1-15.

Ylimaki, R., Moyi, P., Gause, S., Hardie, S., & Tran, H. (2020). Leveraging the perspectives of rural educators to develop realistic job previews for rural teacher recruitment and retention. *The Rural Educator*, *41*(2), 31-46.

Zabel, J. E. (2008). The impact of peer effects on student outcomes in New York City public schools. *Education Finance and Policy*, *3*(2), 197-249.

VITA

Education

Master of Public Administration (MPA) August 2017
Martin School of Public Policy and Administration
University of Kentucky, Lexington, KY

Master of Science in Education May 2004
Department of Instructional Systems Technology, School of Education
Indiana University, Bloomington, IN

Bachelor of Arts in Education February 2002
Department of Education, College of Education
Ewha Women's University, Seoul, Korea

Professional Experience

Associate Researcher January 2022 - Present
Office of Planning, Research, and Institutional Effectiveness
Monterey Peninsula College, Monterey, CA

Research Assistant August 2012 - May 2017
Martin School of Public Policy and Administration
University of Kentucky, Lexington, KY

Research Assistant August 2011 - May 2012
Kentucky P-20 Innovation dLab, College of Education
University of Kentucky, Lexington, KY

Media Planner July 2004 - April 2007
Cheil Worldwide, Inc., Seoul, Korea

Kyung Ha Oh