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Predictive Effects of District Characteristics on Arkansas Transportation Expense

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PREDICTIVE EFFECTS OF DISTRICT CHARACTERISTICS ON ARKANSAS TRANSPORTATION EXPENSE

by

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ABSTRACT

by
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July 2021

Title: Predictive Effects of District Characteristics on Arkansas Transportation Expense
(Under the direction of Dr. David Bangs)

The purpose of this dissertation was to examine the predictive effects of district and community characteristics on transportation expenses of school districts in Arkansas using the Kaldor-Hicks Pareto efficiency theory. The 2004 ruling in *Lakeview School District No. 25 v. Mike Huckabee* mandated adequate and equitable public school funding standards in Arkansas. As a result, school districts are funded using a foundation model where the prior year's average daily membership is multiplied by the foundation amount set by the Arkansas General Assembly. Data were collected from state databases and each school district's website. Of the 235 districts in the state, the 222 districts not receiving isolated transportation funding were analyzed using multiple regression. The results indicated that the district's poverty percentage and square miles significantly predicted the percentage of transportation funded. Average daily membership and percentage of transportation funded significantly predicted the school district's actual transportation expense. The district's average daily membership and square miles did not significantly affect the average age of the bus fleet. Average daily membership and square miles of the district did significantly predict beginning bus driver salary. The

results indicated that average daily membership was not the only predictor variable influencing transportation expenditures, suggesting that an improved transportation funding model could benefit school districts in Arkansas.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

School transportation is an integral part of meeting the needs of the families served by school districts. Across the country, school buses provide the safest form of transportation for approximately 25 million students (Environmental Protection Agency, 2020; School Bus Fleet, 2019). Transporting students to school provides more equitable access to education while reducing parents' burdens with schedules that do not allow them to adhere to the school day's beginning and ending time. School districts across Arkansas receive transportation funding as a part of the foundation funding formula (Arkansas General Assembly House Interim Committee on Education & the Senate Interim Committee on Education [AGAHICE & SICE], 2018). However, each district comprises geographic and community factors affecting transportation beyond the number of students enrolled. The foundation funding of transportation does not account for contributing factors of transportation expense but assumes that school districts can manage their transportation budget given the $331.20 per student allotment. Therefore, budgeting for transportation is a significant consideration for school districts in Arkansas.

Arkansas school districts are funded through a per-student foundation formula. The 2004 ruling in *Lakeview School District No. 25 v. Mike Huckabee* mandated adequate and equitable public school funding standards in Arkansas. The AGA and Arkansas Division of Elementary and Secondary Education (ADESE) developed the

foundation funding model to meet the ruling's adequate and equitable standards. Transportation dollars for the 2016-2017 school year yielded a distribution of $151,808,563, and schools spent $144,770,284 (Bureau of Legislative Research, 2018a). However, per district expenditures ranged from $165.72 to $1,115.04 per student for the same year (AGAHICE & SICE, 2018). Further research is necessary to examine the cause of the large differences among district expenditures. Disbursements are relatively close to the actual expenditures. The examination could provide better data to investigate the adequacy and equity of the current school funding formula.

Districts spending a high percentage of operating funds on the transportation budget are forced to cut in other areas. According to Hightower, Mitani, and Swanson (2010), 32 states have established categorical funding, and 12 states placed a cap on the amount of funding raised for transportation expenditures. Arkansas received an *A*- grade for school funding equitability and an *F* for overall education spending. The survey concluded that Arkansas needs to improve school funding as the formula is inadequate. Additionally, Hightower et al. recommended an improvement in the Arkansas school funding formula to equalize human resources, specifically salaries, across the state. With wages at the forefront of the nationwide bus driver shortage (Jordan, 2020; National Association of State Directors of Pupil Transportation Services [NASDPTS], 2002; Shine, 2018), allocating transportation dollars to cover an increase for bus driver salaries could be a consideration. If districts could become more competitive with other logistic positions requiring a commercial driver's license, district recruitment to hire quality bus drivers could become less of a burden. Without increasing transportation dollars, an

increase in transportation spending would require superintendents to move funds from other sources.

Statement of the Problem

The purposes of this study were four-fold. First, the purpose was to determine the predictive effects of school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public school districts. Second, the purpose was to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts. Third, the purpose was to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet for Arkansas public school districts. Fourth, the purpose was to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas public school districts.

Background

Theoretical Framework: Kaldor-Hicks Pareto Efficiency Theory

Economic and monetary matters involving public funds require efficient allocation of and sufficient funding for the intended purpose. In explaining efficiency theory, Pareto and Montesano (2014) stated that economic efficiency only occurs when no alternative scenario exists, leaving one group in a better situation without weakening another group. Pareto described economic optimality where equilibrium is established to

maintain order within a previously established allocation. Kaldor (1939) and Hicks (1939) revised Pareto's efficiency theory to create the Kaldor-Hicks criterion for efficiency, known as Pareto-efficiency. The Kaldor (1939) and Hicks (1939) model provided for broader use in economics. The revisions included a curve to determine where efficiency can be best obtained while adjusting for needs (see Figure 1). School transportation funding could be evaluated by examining the curves to assess economic efficiency for distribution.

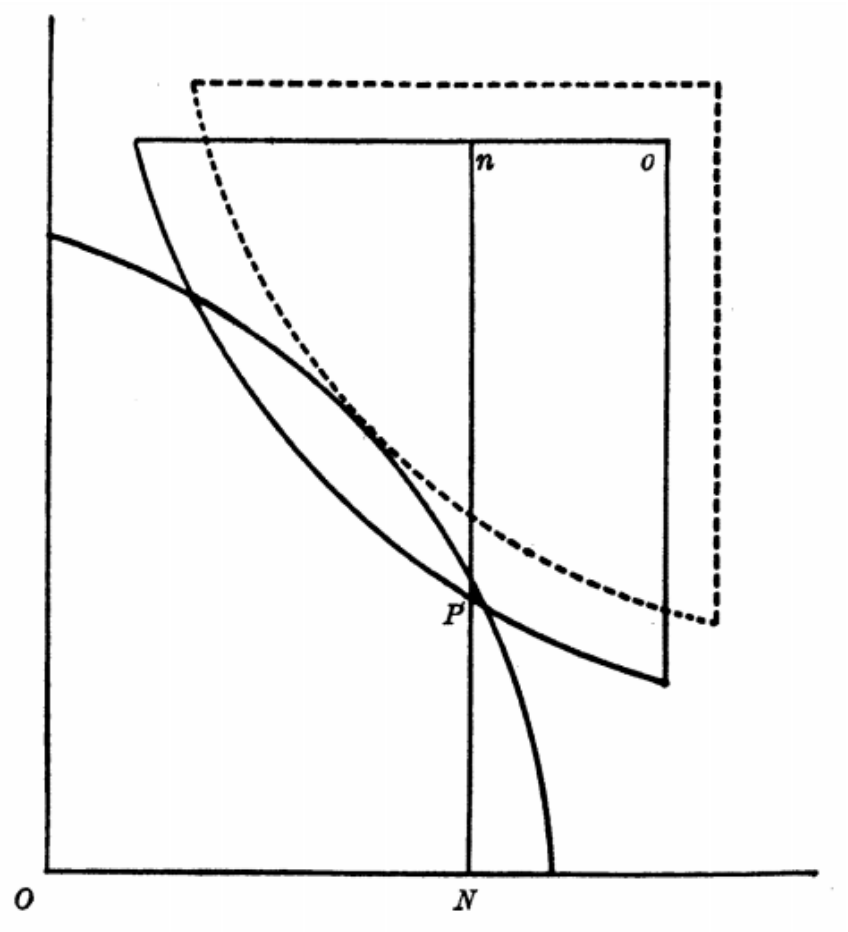

Figure 1. Utility curve with two outputs evaluated. Adapted from "The Foundations of Welfare Economics," by J. R. Hicks, 1939, *The Economic Journal, 49*(196), p. 702. Copyright 1939 by Oxford University Press. Reprinted with permission.

The original Pareto-optimality theory worked to maintain or improve the current situation individually. The Kaldor-Hicks Pareto efficiency theory built upon Pareto's original idea by examining the group's collective good and then redistributed wealth to establish a system where each group was at least as economically stable were before the analysis (Ingham, 2010). This adjustment creates a better economic analysis framework than Pareto's original theory because of the robust nature of preferential outcomes. The Kaldor-Hicks model considers the subjective preferences of the groups involved.

The Kaldor-Hicks criterion is used as a test of efficiency, whereas Pareto's results provide efficiency goals. Through this change, the Kaldor-Hicks efficiency theory identifies factors of change that would cause the most significant positive effect on the economic group as a whole (Hicks, 1939; Kaldor, 1939). In Figure 1, the utility curve examines how the movement of A in a positive direction negatively affects utility B. Q is the economic resource; so, moving from point S to point R would increase *Y*s utility while decreasing *X*s utility. Through examination, a determination should be made to find if this decrease in X is compensated through greater efficiency as a whole group. This efficiency would create equilibrium within the group with positive effects overall.

Funding and Finance

Judicial and legislative processes shaped Arkansas school funding. In *Lakeview School District No. 25 v. Mike Huckabee* (2004), the courts ruled that before 1994, Arkansas school funding was inadequate and inequitable. In response to the ruling, Arkansas developed the per-pupil funding formula providing funding to school districts at the year's foundational amount, multiplied by the number of students enrolled in the district. The ADESE adjusted state funding for local contributions to each school district

for the year. The state required each school district's residents to provide a minimum of 25 mills on the uniform tax rate for maintenance and operation (Arkansas Department of Education [ADoE], 2018). The collections from the local district's property owners are used to offset an equal portion of Arkansas' foundational funding amount. The foundation funding model gives school districts a budgetary baseline to examine school finances for each school year.

Arkansas provides transportation funding to school districts through the foundation funding model. Within the model, Arkansas provides $331.20 of unrestricted transportation foundation funding through the foundation formula ("An Act to Amend," 2019). Transportation funding is provided for each student, whether the student travels to school in a bus or personal vehicle. In 2017, of students traveling to school, 54% rode in private vehicles, 33% rode the school bus, 10% walked or rode a bike, and 2% used public transit or other means to travel to school (Federal Highway Administration, 2017). School districts with a higher percentage of bus riders potentially spend more of their transportation foundation funding on transportation. Similarly, districts with a low percentage of bus riders will spend a lower portion of their foundation money on transportation. The school funding foundation formula was designed to meet the requirements set forth by the appellate courts, establishing an adequate and equitable funding system for Arkansas school districts without consideration of factors contributing to transportation cost due to unique district characteristics.

While public school districts are expected to spend taxpayer money efficiently and effectively, the legislature is responsible for ensuring funds are equitably appropriated to school districts, providing the resources necessary for students' adequate

education. Student transportation is a significant expense of school districts within the state, but the cost varies significantly among districts (Bureau of Legislative Research [BLR], 2018a). The *Lakeview School District No. 25 v. Mike Huckabee* (2004) court ruling shaped the current Arkansas school foundation funding model. Following this ruling, Arkansas initiated foundation funding for school districts, establishing a set amount of funding per student that each district receives to provide an education to the students served. With wide variations in districts' geographic factors, examining transportation funding to actual district expenses should be completed to determine whether financing is inadequate or inequitable. Providing safe transportation to students is a financial responsibility of the school district supported through Arkansas' foundation allocations.

Additionally, school transportation expenditure is influenced by changes to the legal and political landscape. According to Liscow's (2018) trend regression model, court decisions nationwide increase per capita school spending by $195, with $150 coming from increased taxes. The judicial system can significantly affect a state's ability to fund school districts. During the economic downturn in the early 2000s, tax revenue reduction was met with a lower funding rate for public schools. As the economy has rebounded, an increase in state aid funding has led to increased perceived funding fairness. Baker (2014) discovered no correlation between funding fairness and spending fairness within school districts. Even when the judicial system mandated an increase in school funding, the way school districts spent the money was not necessarily equitable when compared to other districts. Therefore, increased funding across the state does not mean that all students will receive increased funding benefits. Districts demonstrating an established need will spend

additional dollars much differently than districts with an established surplus, ultimately affecting the school district's availability of instructional funds. The state's legal and political landscape can have a notable influence on a school district's available funding.

The Arkansas General Assembly (AGA) has acknowledged the need to extend additional transportation funding to districts with high transportation expenses. District transportation expenses vary from $165.72 to $1,115.04 per student (AGAHICE & SICE, 2018). With some districts expending three times the per-student transportation allocation, the operating budgets become tighter, necessitating cuts in other areas. The general assembly passed Arkansas Code §6-20-2305 ("An Act to Amend," 2019) to meet school transportation's adequacy requirements, providing an increase to the foundation funding amount per student and establishing additional enhanced transportation funding totaling $5,000,000. However, the transportation foundation allocation was not increased as part of the foundation funding increase. Enhanced transportation funding is supplemental to the foundation funding amounts and is provided to districts with an established need for additional transportation money. School districts with established needs are provided the financial means to safely transport students to and from school through additional funding. The Arkansas legislature has worked to maintain equity in school funding by providing additional support to districts in need.

Isolated school transportation funding is an additional consideration in the examination of transportation funding in Arkansas. Schools with enrollments of less than 350 students were required to consolidate or annex another district when the Arkansas Generally Assembly passed Act 60 of 2003 (BLR, 2018a). Additional funding for school transportation was then provided for school districts with greater transportation expenses

due to the long bus routes required to transport students due to consolidation. Thirteen school districts in Arkansas receive isolated transportation funding. School consolidation requires the new district to transport students to a new school farther from the original school. These transportation expenditures are outweighed by the salary savings of consolidation when examined as a whole, but the additional transportation expenses are cumbersome to a smooth transition when combining districts. Arkansas developed isolated transportation funding to ease the financial burden of transportation for consolidated and annexed districts.

Status of Transportation

Children across the country depend on school buses for transportation to and from school. School buses provide the safest transportation for students (Environmental Protection Agency, 2020). Nationally, 25 million students ride a school bus each day, traveling approximately 4 billion miles each year (School Bus Fleet, 2019). With many students riding a school bus, the school bus fleet travels several thousand miles each day. Each mile driven requires school districts to spend money on the upkeep of the bus, fuel, and bus drivers' salaries. School districts with more linear miles to drive will acquire higher costs than districts driving fewer linear miles. Thus, school districts must consider the number of bus miles driven daily during the budgetary process.

The cost of purchasing and maintaining the school bus fleet contributes to the district's yearly transportation expenditures. Nationally, the school bus fleet's average age was 9.1 years in 2017, with a retirement age for large school buses at 16.2 years (McMahon, 2017). Additionally, the average school bus clocked 14,708 miles per year. The Commission for Arkansas Public School Academic Facilities and Transportation

([CAPSAFT], 2012) required monthly preventative inspections by service technicians for each bus in the fleet. The bus must pass the same inspection by the service technician that the state inspectors complete. Any identified repairs must be made before the bus can return to routine use. The average age of the bus fleet and retirement age denotes an aging bus fleet where preventative and general maintenance are budgetary factors. School districts must determine if maintaining the aging bus fleet preserves the budget for the long term more than purchasing new buses.

Bus driver recruitment, training, and retention are essential for the management of the school transportation system. An effective bus driver must maneuver a 40-foot vehicle while monitoring other drivers on the road and the students' well-being on the bus (NASDPTS, 2018). According to the Division of Occupational Employment Statistics (2020), nationally, the average transit bus driver earns $22.03 per hour, and the national average for a school bus driver is $16.01 per hour. The school bus driver makes significantly less than the transit bus driver, and both jobs require the same license for hire. Schools compete with other logistics companies to hire school bus drivers but do not have the same purchasing power in terms of salary as more extensive, private firms. The job openings for the school bus driver position grew 11% last year, growing faster than the average rate compared to similar jobs. School districts across the state have experienced bus driver shortages (Jordan, 2020; Shine, 2018). Because bus drivers have a split day and low pay, districts find the recruitment of personnel to fill vacant positions difficult. Additionally, districts are competing with the higher-paying private sector while running on a state-funded budget, with both factors contributing to the bus driver

shortage across the state. Without the acquisition of appropriate bus drivers, school districts cannot establish optimized transportation plans due to personnel restrictions.

District and Community Effect

School district enrollment is also a factor when examining transportation expenses per student. Rice, Huang, and Derby (2018) recorded that school districts with higher square mileage and lower student numbers acquire a higher transportation cost per student. When dividing equal transportation expenditures among fewer students, the cost per student increases. Higher transportation expenditures included fuel expense, longer bus routes, and maintenance (Rice et al., 2018). With a larger volume of students, more routes mean more drivers, buses, and maintenance of a large bus fleet. Districts with a larger area but fewer students will acquire the same expenses at the same rate but will not have the additional foundation funding to aid in paying for the higher costs. Per student transportation costs are a consideration when examining the enrollment of the school district.

Implementing school bus routes that establish an equitable learning environment among affluent and impoverished neighborhoods creates many complexities. State and federal mandates of reduced cost, increased safety, complex routing, assurance of equity, and increased attendance necessitate local districts to consider diverse and pieced together approaches (Vincent, Makarewicz, Miller, Ehrman, & McKoy, 2014). In Washington D. C., Gross (2019) described a correlation between commuting length and school absences. Without transportation, many students, especially those students living in poverty, would not have the opportunity to attend a school outside of their district of residence. School districts must find a balance between high transportation costs and

providing students with opportunities. School districts may also consider bus route timing to ensure that students living in poverty are not required to get on the bus earlier or have a significantly longer commute than their peers. School transportation must work cohesively with families in poverty to provide an equitable learning environment.

Families in poverty can use school choice to attend a school district outside of their residential zone. Schools must look for innovative solutions for student transportation. In the public education system, school choice requires a reliable and affordable transportation plan. Without adequate school transportation, at-risk families are subject to undue financial burdens. Students are subject to safety risks, and the ability to attend the school of their choice is lost (Vincent et al., 2014). Arkansas Annotated Code § 6-18-1904 (Arkansas Code, 2019a) required families participating in school choice enrollment to provide their transportation to and from school. School districts in Arkansas still receive the foundation funding for transportation for school choice students but can decline transportation for those students. The Arkansas code directly conflicts with Vincent et al.'s (2014) findings that school choice is only possible when the school district provides transportation. To meet the highest-risk families' needs, Arkansas would need to revise the law to accommodate transportation for those students attending school outside of their district. School choice gives families the option to send their children to a school they feel is better suited to meet their child's needs.

Hypotheses

1. No significant predictive effect will exist between school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public school districts.

2. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts.
3. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet for Arkansas public school districts.
4. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas public school districts.

Description of Terms

Average daily membership (ADM). The school district adds together the number of days each student was present and the number of days each student was absent during the first three quarters of the previous school year to determine the average daily membership of school districts in Arkansas. That number is then divided by the number of days in the first three quarters (Arkansas Code, 2014c). The ADESE (2018) used the average daily membership of each district to determine foundation funding amounts.

Average daily transported. According to the ADESE (2018), to be considered a transported student, the family must live at least two miles from the student's assigned school. The average daily transported would be the average number of students eligible for transported designation for the school year.

Beginning bus driver salary. For this study, the beginning bus driver salary was collected by examining each school district's bus driver salary schedule. The beginning salary for the shortest route was used to determine the baseline salary for each district.

Bus miles driven daily. The ADESE (2018) determined daily route mileage through the distance the district's bus fleet travels daily to transport students on morning and afternoon trips.

Foundation funding. For the 2018-2019 school year, Arkansas established a public school foundational funding formula of $6,713 multiplied by the previous school year's average daily membership ("An Act to Amend," 2019). The funding amount includes $331.20 per student in unrestricted funding for transportation expenses.

Percentage of transportation funded. For this study, the percentage of transportation funded was calculated by dividing the transportation foundation funding total for the district by the school district's transportation expenditures as reported in the Arkansas Funding Matrix.

School district poverty percentage. The United States Department of Agriculture (2020) stated that families living at or below 170% of the federal poverty guidelines for 2020 qualify for a free or reduced-cost school lunch. School district poverty status is determined by dividing the number of students qualified for free or reduced lunches by the districts' total number of students.

Square miles of the district. The ADESE (2020) calculated square miles of the district using the shapefiles of original district boundaries from the University of Arkansas at Little Rock Geospatial Information Science and Systems laboratory. The

Calculate Geometry tool in ArcGIS v.10 software was used in 2019 to calculate to the nearest square mile the number of square miles within each school district's boundaries.

Transportation expense. The State of Arkansas (2020) allows the following expenditures for transportation: activities involving the transport of students to and from school, activities used to manage and direct student transportation services, activities related to the operation of student transportation, activities associated with the monitoring of student transportation including the monitoring of loading and unloading students, the service and repair of vehicles, installation of GPS or security devices on a school bus, transport for choice, and up to $2,000 of transportation services not included in the previous. Transportation expenditures include transportation the student to and from school as well as transportation to and from student activities.

Significance

Research Gaps

While public school funding is widely researched, limited research exists on transportation expenditures. Wyoming, Maryland, New York, Arkansas, Louisiana, New Mexico, Oklahoma, and Texas examined school funding through adequacy studies (Picus & Blair, 2004). These studies focused on education funding as a whole and did not isolate transportation expenditures and budget specifics to determine if the school systems' transportation expenditures were met through each state's distribution. Thirty-six states, including Arkansas, use a per-student funding amount for funding school systems (Verstegen, 2014). Further research is needed to determine if this funding method is adequate to provide safe transportation for students to and from school and if the funding is equitably distributed to cover transportation expenses for all districts. Research gaps in

public school funding could exist when looking at transportation funding and expenditures.

Possible Implications for Practice

Research on school finance is abundant, but research on the transportation expenditures for districts is sparse. For 2017, the United States spent more than $25 billion on transportation for kindergarten through 12th-grade public school districts (United States Census Bureau, 2019). Arkansas spent $179,278,000 on school transportation, making up just 0.7% of national expenditures. Foundation funding for Arkansas public schools was established after the judicial ruling on *Lakeview School District No. 25 v. Mike Huckabee* (2004). Under the ruling, school districts in Arkansas must receive adequate and equitable funding across the state. The AGAHICE and SICE (2018) adequacy study of Arkansas public school finance identified a general underfunding for public schools' transportation expenses. The legislature maintained transportation foundation funding at the current level and provided additional transportation funding for districts demonstrating need through enhanced transportation funding. Further research is necessary for specific school transportation expenditures from the state's school districts to examine the predictive effect of district characteristics on the school district's transportation expenditures.

Process to Accomplish

Design

The study used a multiple regression design to examine the four hypotheses. The common predictor variables for all four hypotheses were school district poverty percentage (number of students qualifying for free/reduced-cost lunches divided by the

total district enrollment), average daily membership, square miles of the district (the number of square miles within the district's boundaries), and bus miles driven (daily miles driven by school buses to pick up and drop off students). The criterion variables for the four hypotheses were the percentage of transportation funded (actual transportation expenses divided by the transportation foundation funding), the district's transportation expense (actual expenses related to the daily transportation of students), the average age of the school district's bus fleet, and the average beginning bus driver salary, respectively.

Sample

Of the 235 school districts in the state of Arkansas, this study included 222 school districts. The 13 school districts in the state receiving special isolated transportation funding were not included in the study. Arkansas has identified these districts as needing additional support due to state-required consolidations (BLR, 2018a). Baker, Sciarra, and Farrie (2018) examined the fairness of public-school funding by state, ranking Arkansas 36th in the nation in terms of the funding level per student with an overall fairness ratio of 1.07, with a range of 0.73-1.41 between all states. Additional funding of public-school systems in Arkansas may be required to move the state forward in education and provide Arkansas graduates with the ability to compete nationally for college placement and careers.

Instrumentation

The ADESE databases through the data center and funding matrix comprised the primary instruments for this study. School districts report financial information to the ADESE throughout the school year in cycles (Arkansas Code, 2005). Expenditures and

other data are recorded and provided for public review. Also, school funding notices, supplied as part of the state-required information on each district's website, were used to determine the amounts of isolated school funding and enhanced transportation funding each school district received. Finally, bus driver salaries were identified through each school district's website.

Data Analysis

A multiple regression was used to analyze each of the four hypotheses. Predictor variables were school district poverty percentage, average daily membership, and square miles of the district driven. For Hypotheses 1-4, the following criterion variables were used: the percentage of transportation funded, transportation expense, average age of the bus fleet, and average beginning bus driver salary, respectively. A two-tailed test with a .05 significance level was used to test each null hypothesis.

Summary

Funding school transportation is an integral part of school district management. Since 1980, the average per-student transportation cost has risen by over 75% (Burgoyne-Allen & Schiess, 2017). Without proper management, school transportation expenditures can consume the school district's budget, ultimately taking funding from instructional needs. An examination of a school district's characteristics relative to the expenditures could help guide future legislation in Arkansas and maintain compliance with the *Lakeview School District No. 25 v. Mike Huckabee* (2004) ruling requiring adequate and equitable school funding for the state. An examination of the characteristics of funding and expenditures of the transportation programs within Arkansas' school districts could provide insight into school transportation finance's overall financial situation. This study

is important because of the emphasis on the influence of school factors as a whole and each factor individually to determine the total predictive effect on various criteria. This study seeks to add to the depth of knowledge of school transportation finance in Arkansas. Chapter II reviews the literature associated with school transportation nationwide, focusing on Arkansas law applications to the school transportation finance model.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Operating at maximum financial efficiency is necessary for school districts to balance the budget and state lawmakers to fund the education system's monetary needs. The Kaldor-Hicks Pareto efficiency theory was used to examine the economic potential of reorganizing Arkansas' total school district transportation budget to reach the maximum operating potential of equalizing funding to expenditures so that the disparity of school district transportation expenditures would be more closely aligned to the amount of funding provided (AGAHICE & SICE, 2018; BLR, 2018a; Hicks, 1939; Kaldor, 1939). In the state testimony, *To amend various provisions of the Arkansas code concerning public school funding amounts; And to declare an emergency* (2019), the speaker stated that the three most prominent indicators of school transportation expenditures as discovered by the BLR were average daily membership, school bus miles driven daily, and the number of bus riders. In the literature review, I examined the current Arkansas Annotated Code, the Arkansas school funding foundation case *Lakeview School District No. 25 v. Mike Huckabee,* the school transportation funding policies of other states, and the efficient management studies of school district transportation through the lens of economic optimization. School district transportation funding must be managed at an optimum level to provide adequate transportation services for students.

The literature review provides an analysis of the theoretical framework and established research on school transportation finance. Current and prior school transportation funding is examined through the efficiency theory for Arkansas and other states in the Southwest (Burgoyne-Allen & Schiess, 2017). Then, transportation status is reviewed to look for a link between transportation funding and a school district's ability to maintain the bus fleet and pay a working-wage salary to transportation personnel. Finally, community factors are the focus. Alspaugh (1996) recorded that school districts with proper management overcame most community and geographic factors to manage the transportation budget. Additional research both supported and rejected the concept that school districts could manage transportation budgets without additional funding. Literature, court case rulings, and laws on school transportation finance were reviewed to analyze the Kaldor-Hicks Pareto efficiency theory and potential effects of school district geographic and community characteristics on school transportation expenditures.

Theoretical Framework: Kaldor-Hicks Pareto Efficiency Theory

Operating at maximum efficiency is the goal of private and public sectors. Kaldor-Hicks efficiency theory extends on Pareto's idea. Kaldor (1939) advocated that economists should establish policies on the redistribution of income. The redistribution of income is much simpler when distributing taxpayer money than attempting to redistribute consumer income. Reaching Kaldor-Hicks efficiency in the public sector is more feasible because the revenue is known before the optimization occurs. In the private sector, revenue is dependent on projections of potential consumer purchases. An integral part of economics is examining the fiscal efficiency of an organization (Hicks, 1939). By combining their ideas, Kaldor and Hicks established optimality for economics, where the

variables are factored into an arrangement with the organization's highest efficiency. Income and production work cohesively through efficiency theory to develop an organizational structure to maximize coherence. The theory applies the Pareto optimality theory with additional criteria.

Efficiency theory is a derivative of welfare economics. Welfare economics, the principles which Kaldor, Hicks, and Pareto used for their theories, are based on the ideology that resources can be distributed so that given appropriate substitutions, each participant's position can be increased without diminishing another's position (Scitovszky, 1941). Kaldor (1939) and Hicks (1939) worked to redistribute current capital while adding a substitution capital to enable an organization or group of organizations to reach an economic equilibrium. Kaldor (1939) and Hicks (1939) based efficiency theory on the premise the whole organization could improve the group's total satisfaction by enhancing the positions of some while compensating the parts that lost financial ground with a substitution. The overall efficiency of the economy is then improved. Through their theory, Kaldor and Hicks expanded on welfare economics' capabilities to examine the system's general welfare without harming the organization's parts operating above the efficiency curve. Efficiency theory is a platform for reorganization with the individual and whole considered by building upon an established economic section.

Economic optimality requires analysis and adjustment. Many independent systems exist with an ideal result. Therefore, the financial system contains an indefinite number of possible optimized outcomes (Hicks, 1939). The economic system achieves optimization by creating a product where every part ends in a better position than they

started, without decreasing another part's position. Hicks (1939) further explained that conditions must be fulfilled to determine whether the organization is cohesively optimum, given the infinite number of possible optimized outcomes. The optimality of school transportation finance would occur when all schools can fund their transportation budget without creating distress for another school district. Meeting the Kaldor-Hicks efficiency model requires analyzing the entire budget, analyzing each budget individually, and distributing funding by adjusting the distribution.

Three conditions exist for Kaldor-Hicks efficiency to occur. *Marginal conditions* are the acceptable substitution rate for individuals who consume both products and producers who make both products within the economy (Hicks, 1939). For school transportation, the means of traveling to school would be the marginal conditions. *Stability conditions* require production at a maximum, but stability conditions are not necessary to reach optimality as they are only a minor factor for optimization compared to the third set of conditions. Stability conditions in school transportation funding would occur when transportation dollars are only spent on transportation needs. *Total conditions* examine the market as a whole by requiring the researcher to look at the availability of replacing or extending the product to produce a better outcome. When examining school transportation, total conditions include alternative means of traveling to school and the variables involved in each travel type. Challenging the organization's economic needs establishes the atmosphere necessary to begin the optimization model.

An examination of the organization's variable graphs can provide an idea of optimal efficiency. Reviewing each organizational component's curves will measure the ratio between the marginal costs to ensure both curves are within the same rate. When the

two curves touch, optimization has occurred. If the two curves do not touch, distribution can be altered to find an optimal arrangement. The two curves will connect multiple points to create an indefinite number of options available to reach optimality. All points will not be feasible, so a decision on which optimization establishes the organization's best efficiency, given the additional circumstances, would then be considered. Examining the variables can determine which point of intersection will provide the most significant benefit to the whole organization without placing any part in financial distress. An analysis of the graphs will provide a place to begin reaching economic efficiency providing a range of possibilities for optimality.

Funding and Finance

History

Arkansas school districts receive funding through local taxes and a state distribution formula. A school district in Phillips County sued the State of Arkansas, and the appellate court's final ruling in *Lakeview School District No. 25 v. Mike Huckabee* (2004) declared that before 1994, Arkansas school funding was inadequate and inequitable. Prior to 2003, the foundation funding formula was an *equalization formula* and was not considered adequate until 2004. The equalization was based on equalizing the value of 25 mills based on local wealth. To establish an adequate and equitable funding system for schools, the AGA implemented a foundation funding formula. For the 2020-2021 school year, Arkansas schools were funded at a rate of $7,018 multiplied by the previous year's three-quarter average daily membership. The $7,018 is derived from the value of 25 mills of local wealth and a state supplement to attain the determined amount to meet the adequacy requirement. A portion of the foundation amount, $331.20

per student, is considered transportation funding ("An Act to Amend," 2019). With classroom student maximums, building requirements, and relatively consistent utility rates across the state, the foundation funding system is most effective when all students use the facilities; hence, the same standards apply to transportation expenditures. The foundation funding system would be most effective when all students use school transportation, and funding amounts are allocated to support the operations of the transportation department. However, families can provide private transportation to school, and not all students are eligible for school-provided transportation. Local and state tax collections provide the monetary support required to operate school districts in Arkansas in compliance with *Lakeview School District No. 25 v. Mike Huckabee*.

Before the *Lakeview School District No. 25 v. Mike Huckabee* ruling, school transportation was funded with a reimbursement-based formula. Arkansas Code Annotated §6-20-1703 ("An Act to Amend," 1999) required the ADoE to calculate school transportation funding using the sum of the school district's student aid and transportation allowance. Funding was then adjusted for additional components such as the average number of students transported daily, the district's area in square miles, and population density. The aid amount per student was calculated using the district's density and the student aid chart. To determine which chart to use in calculating student aid, the ADoE would use the total transportation aid allotted by the General Assembly in the yearly budget ("An Act to Amend," 1999). The formula provided Arkansas school districts with a foundation funding amount per student, a funding portion for equipment, and adjustments for other school district characteristics. However, the *Lakeview* ruling

changed how the legislature distributed school funding and transformed transportation funding into a matrix with specific transportation funding placed in a foundation model.

Additional legislative initiatives have influenced school funding. The AGA passed Act 60 of 2003, requiring schools with less than 350 students to consolidate be annexed into another district (BLR, 2018a). During this process, isolated school funding was created to help those districts transition from very small to larger school districts while increasing the newly established district's square mileage. The $11 million set aside for isolated school district funding makes up less than a quarter of a percent (0.25%) of Arkansas' annual education budget. Twenty-five districts in the state receive isolated financing, accounting for 0.3%-26.0% of each district's annual budget (BLR, 2018a). While the allocation is minimal to the state's overall education budget, the portion is significant for most districts receiving the isolated funding. School consolidation required those school districts to transport students longer distances to reduce administrative costs. Legislation has influenced the school funding formula producing larger school districts and expanding the transportation needs of consolidated districts.

The nature of school consolidation creates an environment where students travel long distances to school, increasing the district's overall transportation expenditures. The special isolated funding transportation category gives a set amount each year to qualifying districts, $276,039 in 2017 (BLR, 2018a). After funding the districts with isolated funding and special needs isolated funding, the remaining dollars are divided among districts qualifying for isolated transportation funding. Isolated districts are often characterized by lower student density and larger districts by area. According to the BLR

(2018a), the additional dollars are focused on transportation funding on an as-needed basis. Thirteen school districts in Arkansas receive isolated transportation funding. This funding is restricted to transportation expenses for isolated schools. The isolated funding provides consolidated school districts with the supplement needed to transport students farther distances. In a 2017 survey conducted by the BLR, superintendents of isolated school districts ranked transportation in the top five areas of funding need. With transportation funding needed in addition to the amounts already allocated, additional funds could be necessary for school districts receiving isolated funding. With the requirement of school consolidation, isolated transportation funding provides additional financial support for districts to accommodate the higher transportation costs.

School funding at a foundation level is under reevaluation nationwide. Farrie, Kim, and Sciarra (2019) used national datasets to analyze public kindergarten through 12th-grade school systems' state funding. Fair school funding was defined by the school district's ability to adequately provide qualified teachers, support staff, programs, services, and other additional resources needed to educate students. Arkansas is providing $2,549 per student annually, less than the national average. Low funding levels can indicate political and budgetary influence on the school finance system. Arkansas school districts should receive adequate funding to provide equitable services to all students within the state under the *Lakeview School District No. 25 v. Mike Huckabee* (2004) ruling. If the adequacy and equity requirements are met, school systems will balance their budgets while providing the services and programs necessary for the student population's success. Kansas and New Jersey have adopted weighted average funding formulas to decrease educational inequity in high poverty areas. According to Farrie et al. (2019), this

advanced formula is the hallmark of a fair funding system. The weighted average funding formula works to include geographic and demographic variables in school systems' funding so that districts can meet their community's and families' needs. By evaluating the school funding formula, states can provide support for school districts' financial needs.

Transportation Funding in Arkansas

School district funding in Arkansas uses a foundation funding formula to determine the distribution allocated to each district. During the 2015-2016 school year, the state distributed $151,727,460 in transportation foundation funding, and school districts spent $149,378,812 of the distributed funds (BLR, 2018b). For the 2016-2017 school year, the state distributed $151,808,563 in foundation transportation funding, and school districts spent $144,770,284 of the allotted funds. In both years, the foundation funding amounts were close to expenditure amounts, but the resulting proportion did not indicate equity within the distribution. Districts with fewer students had much higher transportation expense percentages than larger districts. Smaller districts also had much higher bus rider rates than larger districts, creating higher route miles being driven daily. Larger districts receive higher amounts of funding but transport proportionally fewer students fewer miles. Arkansas school district funding, including transportation, is examined for adequacy every 2 years through a study conducted by the BLR (2018a). The 2018 Adequacy Hearings determined a need to increase foundation funding for teacher salaries, instructional materials, operations, and maintenance. Transportation was the only foundation funding category not to receive an increase (BLR, 2018a). The report indicated that additional transportation dollars were needed in some districts but not all.

The gaps between actual expenditures and funded amounts were addressed on an as-needed basis by the legislature instead of increasing funding for all districts. The adequacy hearings provide an examination into school finance in Arkansas and guide the General Assembly for the next 2 years of public education budgetary decisions.

Transporting students to school requires additional consideration when examining funding adequacy. Enhanced transportation funding was developed to address the budgetary shortfall identified by the BLR (2018a). The bureau determined that average daily membership, school bus miles being driven daily, and the number of bus riders were the most significant indicators of the need for additional transportation funding ("An Act to Amend," 2019). School districts with higher indicator levels are provided additional support for transportation services. Enhanced transportation funding supports school districts with an established need for additional transportation dollars without increasing the foundation funding level. The transportation expenditures and funding amounts are analyzed to determine if each district requires additional transportation funding.

Enhanced transportation funding is calculated and distributed yearly. Currently, the ADESE provides enhanced transportation funding to 109 school districts in amounts ranging from $117-$146,745 ("An Act to Amend," 2019). The Division of Elementary and Secondary Education distributes $5 million annually of enhanced transportation funds (BLR, 2020). The amount of distribution for school districts is calculated yearly by the BLR, but the exact formula is not released for review (W. Cartwright, personal communication, September 21, 2020). Without a written formula, school districts do not

have the means to predict the next year's allocation. Through this process, enhanced transportation works as supplemental funding for Arkansas' eligible school districts.

School districts are allowed to seek outside funding to supplement the transportation budget. For instance, under Arkansas Annotated Code § 6-17-129 (Arkansas Code, 2015), school districts can place business advertisements on school buses in exchange for an advertising fee from the business. Any revenue from the advertisement is restricted to funding school transportation. By placing advertisements on the side of school buses, school districts can receive additional funding for student transportation. School districts should limit advertisements to only those that meet the standards set forth by the CAPSAFT (Arkansas Code, 2015). Seeking outside funding through advertisements on the side of a school bus allows school districts in Arkansas to supplement their transportation budget.

Funding transportation for school systems within a state requires a planned budgetary strategy. Burgoyne-Allen and Schiess (2017) stated that the three strategies for funding transportation are cost-based reimbursement, per capita reimbursement, and mileage-based reimbursement. Cost-based reimbursement provides funding based on average expenditures. Per-capita reimbursement provides a set funding level per student. Mileage-based reimbursement, or linear density, provides reimbursement based on the actual miles driven or the average miles driven per student. Each state determines which strategy, or combination of approaches, will fit the school systems' needs. Arkansas uses the per-capita reimbursement model to fund school districts with a foundational funding level per student (Arkansas Code, 2014c). Additionally, Arkansas supplements high-need districts with a cost-based reimbursement model through enhanced transportation

funding. By providing additional funding for transportation to school districts establishing a need, Arkansas works to create efficiency within the state's school finance distributions. This combination of strategies works to provide a baseline for the planning of educational expenditures within the state.

All three funding models are combined to fund transportation for Florida's school systems. Florida provides funding for school transportation by distributing the general assembly's appropriation amount yearly ($444,978,006 for 2019-2020) to the state's school systems (Florida Department of Education, 2019). Factors for funding distribution include transportation to school, the number of students eligible for transportation, and transporting students with disabilities. Then, adjustments are made to the system's portion of funding for cost-of-living, the district's transportation system's efficiency, and the district's population density. Much like Arkansas, Florida ensures that monetary disbursements are fully funded for transportation finance. However, this system does not necessarily equate to full funding for transportation, as the system has limited funds to disperse. Through a thorough examination of each district's demographic and financial statistics, the Florida Department of Education provides school districts with transportation funding.

Alabama uses a cost-based funding model. The state sets a funding amount for the transportation of all districts (Lassiter, 2019). Then, district transportation costs are examined with salary caps. The number of employees allowed for consideration of reimbursement is factored into the formula. Next, the bus fleet's age and the number of miles required to run bus routes are examined. Each district is reimbursed for the actual cost as a proportion of the total funding. Alabama's approach reimburses school districts

for their actual expenditures, eliminating the availability of transportation dollars for other spending. This approach could lead to higher salaries for transportation personnel and a newer bus fleet because districts focus transportation dollars solely on transportation. Alabama's formula varies greatly from Arkansas' foundation approach. Arkansas provides funding based on the number of students within the district. Alabama's cost-based funding focuses on the actual transportation expenditures, allowing for reimbursement based on the number of routes, not the number of students within the district.

Per capita funding is used to fund transportation in Mississippi school districts. Mississippi allocates $16 million to the Education Enhancement Fund. In Mississippi, 7.97% of the Education Enhancement fund is distributed to school districts for transportation and maintenance expenditures (Mississippi Code, 2019). School districts receive funding based on the previous school year's average daily attendance. Alabama and Mississippi set a total allotment for the state's school transportation budget, but their allocation criteria are different between the two states. Mississippi's formula uses average daily attendance, whereas Alabama uses the prior year's expenditures. Mississippi's approach is similar to the foundation funding in Arkansas, but funding distribution differs as the total allotment is predetermined before the allocations are established. With Arkansas' foundation funding formula, the state's total expenditure changes yearly based on the number of students enrolled. Mississippi and Alabama's funding formula provide a set amount by the legislature. Arkansas' funding formula offers superintendents strong estimations of future funding allocations, as long as enrollment does not suddenly decrease.

Kentucky uses a combination of the mileage-based and cost-reimbursement methods. The Kentucky Department of Education (2020) used an average of the prior year's transportation cost and pupil density to compare the state's districts with similar size and density. Districts with higher efficiency are rewarded, and district transportation managers are given a measure to compare their transportation systems. Kentucky's method of funding school transportation works to reward the efficiency of the district's transportation system. By comparing districts with similar characteristics, the Kentucky Department of Education establishes benchmarks for other districts to measure their programs. Through this process, Kentucky annually measures the school transportation program's expenditure efficiency.

Transportation Expenditures

Transportation dollars can be maximized to have the most significant positive effect on students through effective management. Transportation management must consider safety and comply with all laws and regulations (Ammon & Burns, 2011). The goal of transportation management is to transport all students receiving transportation services to drop-off and pick-up locations by spending the least amount of money. Transportation cost is the core issue in managing services. Increasing operational expenditures, expanded services, and meeting high stakeholder expectations for safety and timeliness add additional pressure to the public school transportation system's costs. Further, budgetary consideration is necessary to include equity concerns, school choice, and attendance support (Vincent et al., 2014). Transportation management also supports students' educational needs by providing safe transportation to and from school. The community's support in making necessary changes to the school transportation system is

essential for lasting positive managerial changes. Through proper management, school transportation can serve as a critical part of the educational process.

Without additional funding, school districts must look at expenditure reduction to optimize the transportation budget. Three options are available to reduce school transportation expenditures: eliminate transportation, consolidate bus stops, and change bell times. Often, the public outcry over these changes is much more massive in proportion to the magnitude of the changes implied (Ammon & Burns, 2011). The Massachusetts Institute of Technology developed software for the Boston City School system. The software demonstrated the necessity of altering school start times with age appropriateness in mind to optimize transportation expenditures. Due to public outcry over changing school start times, Boston City School System could not fully implement the Massachusetts Institute of Technology model, forfeiting the estimated $12 million annual savings (Bertsimas, Delarue, Eger, Hanlon, & Martin, 2020). Because parents need to get to work on time and business leaders need their employees at work during specific hours, stakeholders' challenges can outweigh the school system's financial benefits. School administrators should work with stakeholders in the decision-making process of changing a school's timing structure. By listening to stakeholders, a school can restructure and save transportation dollars while maintaining community relationships. An expenditure reduction model is often challenging to establish but can maximize the school transportation budget.

Transportation funding is not guaranteed for students in every state. In *Lora Hoagland v. Franklin Township Community School Corporation* (2015), the Indiana Supreme Court ruled that school districts in Indiana are not required to provide student

transportation to or from school. The court cited the school transportation law's wording, stating school districts *may* provide transportation to pupils as grounds for school districts' flexibility in determining if the system would continue offering transportation services. Arkansas Code (2014b; § 6-19-102) is worded much like the law in Indiana: schools are given the authority to provide transportation but are not explicitly required to provide services. Arkansas' foundation funding includes a transportation component to unrestricted funding, potentially leaving districts with unspent transportation foundation funds allocated to other areas of the budget. Indiana does not guarantee students' transportation to and from school, a decision made based on the wording of Indiana law that parallels the Arkansas code's language.

Status of Transportation

Age of Bus Fleet

Purchasing and maintaining the fleet of buses for the school district is a significant transportation expense. According to the *Lakeview School District No. 25 v. Mike Huckabee* (2004) ruling by the Supreme Court, "The State must also provide equality in public school buildings and equipment, and that disparities created by past inequitable funding must be cured" (p. 8). If school buses fall under the *Lakeview* ruling public school equipment section, examining the age and condition of school bus fleets within the state should occur to determine whether those resources are distributed equitably. Arkansas has negotiated a school bus purchase contract to promote equity among students and mitigate the expense of increasing the school bus fleet (Arkansas Department of Finance and Administration, 2019). The contract uses a volume discount by combining all districts' purchasing power and allows every district to purchase buses

used for student transportation at a reduced rate. School bus premiums are prenegotiated by the Arkansas Department of Finance and Administration to find the best pricing on school buses, maintaining the fiduciary responsibility to taxpayers without requiring each district to negotiate the price. The lower cost of a school bus is a way for the state to support the school transportation system to maintain compliance with *Lakeview* without the school districts spending additional dollars. School buses are a necessary expense in transporting students safely to and from school.

The purchase and maintenance of school bus fleets are considerations for the transportation budget. School buses sold in 2017 were 77% diesel, 16% gasoline, 6% propane, 1% compressed natural gas, and less than 1% electric (Burgoyne-Allen & O'Keefe, 2019). Under the Arkansas Department of Finance 2019 bus purchase agreement, Type C school buses seating 65 passengers cost between $78,352.00 and $80,505.49. Because the cost of a school bus is equivalent to almost two full-time teachers' salaries, school districts work to maintain their current fleet of school buses for as long as possible to reduce transportation expenditures. One way to minimize wear and tear on school buses is to reduce idling time. An hour of idle time for a school bus uses half a gallon of fuel. A school bus will acquire the equivalent of 1,000 additional miles of wear and tear if left idling for an hour each day (Burgoyne-Allen & O'Keefe, 2019). Policies to reduce idle time would save a school district from additional maintenance and fuel costs while lengthening the fleet's life. The cost of purchasing and maintaining the school bus fleet should be managed to extend the transportation budget.

Purchasing a new school bus is an expense requiring a multitude of considerations. The most significant determinant for replacing school buses is available

funding. However, according to the NASDPTS (2002), districts should also consider replacing school buses when federal standards for fuel efficiency and exhaust emission become more restrictive. The organization also recommends that school districts consider replacing school buses if maintaining the existing school bus is higher than purchasing a new one. The NASDPTS stated that school bus maintenance costs sharply increase after 12 years of use. Most school buses should be replaced by the 15th year of service. School buses traveling routes with terrain and road conditions that are not highways, school buses in extreme climate conditions, and school buses stored outside should be replaced sooner than 15 service years. Additionally, high annual mileage should also lead to replacing a school bus sooner than 15 years, but low yearly mileage does not extend the school bus' life. Replacing a school bus requires the district to consider if the bus purchase amount will be lower than the amount to continue maintenance and repairs on the current school bus. With a 15-year timeline, school districts should consider the upcoming expenditures and budget accordingly. Through proper planning, school districts can manage the bus fleet extending the transportation budget.

School transportation is affected by the number of miles driven by the school buses each day. In Arkansas, daily route mileage is calculated as the distance the bus fleet travels daily to transport students to and from school (ADESE, 2018). In 2017, nationally, the average student traveled 4.4 miles to school (Lidbe, Li, Adanu, Nambisan, & Jones, 2020). The average elementary school student spent 21.08 minutes commuting to school, and secondary students spent 26.76 minutes traveling to school. Expenses are contingent upon the number of miles driven. Fuel, maintenance, and bus driver salaries inherently influence transportation expenditures, increasing costs as the route miles

increase. School districts must account for school bus miles driven daily as a part of the budgetary process.

Preventative maintenance and repairs are greatly influenced by the number of miles driven on the school bus. The CAPSAFT (2012) suggested that inspections of the bus' safety equipment and an adjustment of the air brakes should occur every 1,000 miles, a diesel school bus should have an oil change every 6,000 miles, and an inspection of the transmission should occur every 24,000 miles. Inspection results must be kept on file for the school district's length of use of the school bus. According to the CAPSAFT, when making school bus repairs, districts should ensure that the repair is completed with replacement parts and specifications comparable to the original manufacturer's parts and placement because manufacturers ensure the school bus meets all federal and state standards during production (NASDPTS, 2017). Following repairs, school administrators and contracted repairers should inspect requirements to accept the repairs clearly defined. Inspection and maintenance of the school bus fleet can lead to fewer repairs. When completing repairs or maintenance, school personnel should make sure the job is completed to meet the safety requirements in state and federal law. The length of the usable life of a school bus can be extended through proper maintenance and repair.

Bus Driver Salary

School bus drivers must meet all federal, state, and local eligibility criteria for transporting students to and from school. According to the NASDPTS (2018), requirements to drive a school bus include holding a commercial driver's license, preservice training, inservice training, criminal background checks, drug and alcohol testing, medical fitness, driving history record, and the ability to complete pretrip and

posttrip inspections. The CAPSAFT (2012) required school bus drivers to obtain a commercial driver's license, hold a certificate of inservice training (24 hours of preservice and 3 hours yearly), complete a physical examination with a health care provider, submit to state and federal background check, consent to semiannual review of the driving record, have a negative tuberculosis skin test, complete preemployment and random drug testing, and meet any other requirements set forth by the local school district's board of directors. With the state and federal criteria in alignment, the requirements to obtain a school bus driver's license are clearly defined. School districts must recruit and retain qualified bus drivers meeting the criteria for eligibility. School districts work with current and potential bus drivers to document that all requirements are met yearly to drive a school bus.

Hiring and retaining school bus drivers is critical in planning a school system's transportation. The NASDPTS (2018) acknowledged the country's bus driver shortage. The NASDPTS also recommended that school districts place additional efforts in ensuring bus driver salaries are comparable to the salaries of similar jobs within the industry and that wages are aligned with the complexity of the job duties performed. School districts should recruit and retain qualified personnel to limit the need for drivers with temporary licenses. By addressing salary concerns as recommended by the NASDPTS, school districts within the state could strengthen the pool of candidates for bus driver positions reducing the bus driver shortage. Arkansas allows an exception for substitute bus drivers to drive a school bus temporarily without inservice training when a qualified bus driver resigns, passes away, is ill, or when a school board of directors is unable to find another suitable bus driver (CAPSAFT, 2012). The substitute driver must

meet all other requirements, including a current commercial driver's license. The exception allows school districts to continue transportation operations without disruption while the new individual completes the requirements to obtain a school bus driver certification. Through this exception, Arkansas has provided school districts with an extended period to recruit quality personnel to drive the school bus. School districts should work to fill bus driver positions swiftly with a qualified individual.

Bus driver salaries are influenced by the bus driver's training time required to safely transport students to and from school. According to the Committee on School Transportation Safety (2002), at the operational level of school transportation, the following variables must be considered: bus drivers and students need different training, different routes should be established into and from the school for buses and passenger vehicles, the differences in roads and infrastructure among the communities within the state should be evaluated, and security of the school bus fleets should be kept secure. Each of these variables has an associated cost that must be considered when hiring transportation personnel. Bus driver training is necessary to keep students and roadways safe (Committee on School Transportation Safety, 2002). First, bus drivers should be trained in bus behavior management techniques to the same extent that teachers are trained in classroom management. Establishing different school bus routes for school buses and passenger vehicles reduces the risk of a student getting hurt while speeding up the loading and unloading process. However, different school routes are only possible if school parking lots have at least two driveways to accommodate the other vehicles. Additionally, bus drivers require training on the new routes and safety training to load and unload students (Committee on School Transportation Safety, 2002). Finally,

keeping the bus fleet secure requires drivers to spend additional time inspecting their buses before and after use, adding to the hourly salary necessary to employ bus drivers. Qualifications and training are essential to consider when hiring and retaining quality drivers.

School districts have additional costs to consider when hiring personnel. Arkansas school districts must provide the same health insurance benefits for bus drivers as the district does for teachers if the driver meets the 720-hour yearly requirement, receives their primary income through driving a school bus, or if the superintendent of the school district designates said personnel with full-time status (Arkansas Code, 2014a). For the 2020-2021 school year, school districts contributed $161.87 monthly or $1,942.44 yearly per employee for health insurance premiums (ArBenefits, 2020). Insurance expenses are a large part of the costs associated with transportation salary considerations. Insurance expense is a fixed expense that the district pays per employee and is correlated to the employee's salary. Health insurance is an added benefit for bus drivers and a great recruitment tool for hiring, yet an additional expenditure for the school district to consider when budgeting.

School districts in Arkansas should also consider retirement contributions when budgeting for transportation employee expenditures. Under Arkansas Annotated Code § 24-7-202 (Arkansas Code, 2019b), an active member is any person eligible for service credit while working for an employer covered under the Arkansas Teacher Retirement System. For the 2020-2021 school year, school districts contributed an amount equal to 14.5% of the bus driver's salary to the Arkansas Teacher Retirement System (2020). With the retirement contribution based on the driver's salary, bus drivers' higher wages also

equate to higher contributions to the Arkansas Teacher Retirement System for the school district. The school district's retirement contributions should be considered when creating the transportation budget and when hiring transportation personnel.

District and Community Effect

Square Miles of the District

The percentage of transportation funded within a district is supplemented or reduced by the district's expenditures. Alspaugh (1996) concluded that school districts could overcome geographic factors of per-pupil transportation expenses through proper transportation management, except for very small school districts. Class 1A school districts in Arkansas would be categorized as small under Alspaugh's research. Alspaugh also determined that very small districts could not appropriately shrink their transportation expenses to levels as low as other districts. School districts can maximize transportation dollars efficiency with proper management, maintaining funding availability for instruction and support services. By increasing the percentage of transportation funded, districts may provide equitable services to all students. Increasing transportation funding can be accomplished by increasing transportation funding or decreasing the transportation system's expenses. Class 1A school districts in the state need additional support to provide transportation services to students without taking away from the school district's general budget. School districts should work to provide transportation services to students in the most efficient way possible.

Utah and Michigan commissioned studies on transportation funding to determine adequacy and fairness. Rice et al. (2018) concluded that in Utah, nonrural school districts spent 3.4% of their total general funding on transportation, and rural districts spent 5.4%

of their available funding budget on transportation. Rural districts spent an extra 2% of their transportation budget, leaving less funding for instruction and support. Furthermore, in Michigan, Van Beek (2011) determined that rural schools used the highest percentage of their operating budgets, 4.97%, on school transportation along with the highest per-pupil expenditure of $484. The higher amount of per-pupil spending in rural districts reveals unbalanced transportation funding statewide. Additionally, Morgan, Presume, Grech, and Amerikaner (2020) found that school districts in low-populated areas do not have the high economies of scale as densely populated areas. These same districts also have higher transportation costs. With all other attributes equal, rural districts require higher funding levels to provide equal services to students. Rural districts must reduce spending in other areas to account for higher transportation expenses, and urban districts can allocate additional dollars to other operational costs. State and education leaders across the United States are examining the expenditures of school systems to find efficiencies in funding schools.

Average Daily Membership

The population density of the school district contributes to transportation expenditures. Van Beek (2011) determined that Michigan school district transportation expenses were 1.3% higher for highly populated areas than for less densely populated areas related to the district's total operating cost. Proportionally, more densely populated regions experience higher transportation rates in comparison to the overall budget. According to the Minnesota Department of Children, Families, and Learning, Program Finance Division (2002), districts serving more than 200 students per square mile were funded at a much higher rate, 102%, than districts with less than 200 students per square

mile, 92.4%. The two studies established different results for the respective states. These contradicting results demonstrate the need for further research. Considerations for transportation in higher-density areas are much different from the considerations in lower-density areas. A standard diesel Class C bus' fuel economy is 7 miles per gallon for a city route and 7.49 miles per gallon for a rural route (Carolina Thomas, 2014). Much like a standard vehicle, school buses use more fuel per mile when stopping and going at stoplights and waiting for in-town traffic to clear. Transportation expenses can be affected by the population density of the school district's community.

The funding of district transportation needs could differ based on the school community's characteristics. The Minnesota Department of Children, Families, and Learning Program Finance Division (2002) recommended that the state create a small grant program for smaller districts to apply for recovery of their actual transportation expenses. Additionally, Larkin (2016) concluded that smaller school districts spend much higher percentages of their budget on operating expenses, including transportation. This increased spending is funded by decreasing instructional funding. An additional 10% of the base funding to school districts with less than 1,000 students was suggested to offset this issue. The Minnesota Department of Children, Families, and Learning Program Finance Division Larkin both recommended funding school district transportation based on the district's individual needs to accommodate variations in expenditures due to differences in the school district's size and communities served by those districts. Each state's geographic and social composition also potentially factored into the results, leading to the differences in outcomes. The characteristics of the school system's community have historically prompted researchers to recommend individualized funding.

For some students, riding a bus to school is a daily necessity. The average distance between familial residence and the school building has increased since the mid-1900s (Beck & Ngyuen, 2017). Since that time, the number of students traveling to school either by school bus or by personal vehicle has also increased significantly. Traveling to school is a significant portion of a child's total yearly travel time. The national data indicate that of children who live within one mile of the school, 23.1% ride the school bus and 48.1% of children living within one mile of the school rode in passenger vehicles (Beck & Ngyuen, 2017). The upward trend of students using school transportation increases the number of miles driven by school buses each day, affecting the school transportation budget. The decline in students riding a bicycle or walking to school could increase motor vehicle traffic coming into and leaving the school. Districts should plan for the increased traffic flow to help organize and control the school zone's safety. Families relying on school-provided transportation expect orderly plans for the safe transport of their children.

Each state sets a specific standard for student eligibility to ride the school bus. According to the ADESE (2018), to be considered a transported student, the family must live at least two miles from the student's assigned school. Texas identifies students as eligible to ride the school bus if they meet any of the following criteria: live two or more miles from their school campus, live in a hazardous traffic area, are transported to or from a grandparent's home, are transported to or from a state-approved child-care facility, are classified as a homeless student, or are in a grade level not offered by the resident district (Texas Education Agency, 2014). Comparatively, Ohio requires transportation for kindergarten through eighth-grade students residing more than two

miles from their school. Districts are not required to provide transportation to 9th- through 12th-grade students (Ohio Department of Education, 2013). The typical standard is a set distance between the school and the family's residence. With the standard in place, school districts can establish efficient bus routes to provide transportation to all eligible students. School districts in Arkansas are then left to determine if they will pick up students residing within two miles of their school. Without a national standard for transportation eligibility, each state can set the transportation criteria.

Poverty

School district poverty level is a consideration when creating the school system's budget. Chang (2018) established that school-based budgeting has three pillars. Equity ensures that a robust funding model exists to ensure that students in need receive additional services. Transparency provides clear policies to determine where, how, and why funding flows to schools. Flexibility provides building-level administrators with the ability to create their budgets to serve their students, faculty, staff, and community best. Lidbe et al. (2020) concluded that rural children traveled almost 2 times longer distances than urban children and had much longer commute times. Additionally, the commute time increased as familial income decreased. Through student-based budgeting, rural school districts and high poverty school districts could allocate financial resources to provide for the greatest needs of the communities served. This allocation could be much higher for rural and high poverty districts than other districts of similar size and a high-income, urban community. Student-based budgeting's core policy is to reduce expenses when possible to provide additional support and resources for schools serving students with exceptional needs, including English Language Learners, special education, and

high-poverty areas. Maximizing transportation dollars is key to providing additional resources to schools in need. School-provided transportation is a great need for families living in rural communities and families living in poverty.

In North Carolina, the income gap between counties has widened, creating a disparity between school funding in the two county types. Fox, Kaazouh, Wagner, and Lee (2019) found that wealthy counties provided a higher revenue stream to their districts with a lower tax burden than counties of poverty. The average per-student transportation spending in North Carolina in 2016-2017 was $1,652. Orange county spent $5,025 per student, and Swain county spent $424 per student. The sum of per-student spending for the seven poorest counties totaled $396 less than the amount spent on one student in Orange County. Fox et al. also noted that during the 2016-2017 school year, districts spent $3.1 billion of their local funding on instructional expenses. With the variable of the district's socioeconomic status as a factor, looking at the effect of socioeconomic status in North Carolina demonstrates a high need for state support in funding. North Carolina divides their funding with the state providing the funds for instructional expenses, and the local tax base is allocated to capital projects. The large differences in revenue between counties could create an unequal educational program for the state.

School choice allows students to attend a school that can better meet the individual student's needs regardless of restrictions from the family's resident school boundaries. Cordes' and Schwartz's (2019) analysis of the New York City School System revealed school choice students were 10 times more likely to use transportation than students attending the school where they reside, and students attending a school-by-school choice attended schools with higher academic growth rates than the school where

they live. Additionally, a 38-50 percentage point gap existed between students who resided in the district where they attended school versus students attending school through school choice on the need for transportation. When students live in poverty, school districts remove barriers presented by the students' residential location. Many families find the school district able to meet their child's needs through school choice. Restrictions associated with poverty make transportation to and from their choice school a hardship without intervention from the district of choice.

The level of familial poverty varies by region in Arkansas. The highest level of poverty within the state is in South Arkansas. According to the Office of Educational Policy (2020), the Southeast and Southwest rank highest of the five regions, with 75% and 68% respectively of students qualifying for free and reduced lunches. The Northeast region with 62% of students qualifying for free and reduced lunches follows, with the Central region (58%) and Northwest Region (56%) containing the lowest percentage of students receiving free and reduced lunches. Poverty is a statewide issue, affecting students in all regions, but is much greater in the Southern region of the state. Providing transportation to school is further influenced by commute times. The average adult commutes 21.7 minutes to work in Arkansas (United States Census Bureau, 2020). High levels of poverty paired with commute time could create a greater need for student transportation, increasing the proportion of transportation within the school district's budget. Consideration of community needs for student transportation could influence the transportation expenditures per student.

Summary

A review of the literature suggested that school size might not be a strong enough predictor of a school district's monetary needs for transportation. Although the research supported the concept of enrollment affecting transportation needs (Alspaugh, 1996; Rice et al., 2018; Van Beek, 2011), the research was unclear and inconsistent in determining the scale to which school size affects transportation expenditures. Further, the school bus driver shortage across the state noted the need to increase transportation spending to accommodate a higher wage for bus drivers (Jordan, 2020; Shine, 2018). Financing higher salaries lead school districts to restructure their budget to accommodate higher transportation expenditures or lobby the legislature for additional funding. Therefore, the aforementioned is crucial to examine the factors associated with transportation finance in Arkansas to guide decision-makers on school districts' needs based on their characteristics. Chapter III details the methodology, including design, sample, implementation, data collection procedures, analytical methods, and limitations.

CHAPTER III

METHODOLOGY

The review of the literature indicated the need to analyze school districts transportation expenditures. With the stringent requirements for school bus driver certification and a shortage of bus drivers across the state, transportation funding is imperative to the ability of a school district to provide services to all students (CAPSAFT, 2012; NASDPTS, 2018). Additionally, the cost of purchasing and maintaining a bus fleet can be of great concern (Alspaugh, 1996; CAPSAFT, 2012; McMahon, 2017; NASDPTS, 2018). Providing transportation to all students requires the district to consider the number of students riding the bus, the miles the fleet will travel daily, and the amount of funding available to manage the transportation department. As a result, the following hypotheses were generated:

1. No significant predictive effect will exist between school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public school districts.
2. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts.

3. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet for Arkansas public school districts.
4. No significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas public school districts.

Research Design

This study was conducted using a quantitative, non-experimental, multiple regression analysis. School district poverty percentage, average daily membership, and square miles of the district were predictor variables for all four hypotheses. The percentage of transportation funded was a criterion variable for Hypothesis 1 and a predictor variable for Hypotheses 2, 3, and 4. Criterion variables for Hypotheses 2, 3, and 4 were transportation expense, the average age of the district's school bus fleet, and beginning bus driver salary, respectively.

Before the multiple regression analysis was conducted, assumptions for the multiple regression model were examined to determine if the assumptions were met. Scatterplots were generated to check the assumption of a linear relationship between the variables, homoscedasticity, and normal distribution. The assumption of multi-collinearity was conducted using the tolerance and variance inflation factor values with less than .1 or greater than 10. Identified outliers were deleted as deemed necessary.

Sample

This study examined data for 222 public school districts in Arkansas. The 13 school districts receiving special isolated transportation funding were excluded from the study, as identified by the ADESE. These districts' need for additional funding was due to school consolidation requirements. School districts in Arkansas have a broad spread of data, with transportation expenses ranging from $55,593.00 to $14,209,485.78. The percentage of transportation funded ranges from 30.85% to 238.04%. The smallest school district in Arkansas had an enrollment of 286 students during the 2018-2019 school year, and the largest school district's enrollment was 21,962 students. Additionally, school districts' square miles have a large spread of 21.88 square miles to 921.92 miles. School districts in the state reported 95 miles to 21,289 miles driven daily by school buses. School district poverty percentages range from 23.11% to 97.24%. The beginning full-time bus driver salary varied from $3,293.00 to $14,973.00. School districts manage bus fleets with an average bus age of 4.21 years to 19.21 years.

Instrumentation

The ADESE requires school districts to report data each cycle. The information is then placed into a database for public access. For this study, the ADESE's Annual Statistical Reports collected data for square miles of the district, transportation funding, and transportation expense. The University of Arkansas Office for Educational Policy, Arkansas School Data-Demographics database was used to collect data for each school district's enrollment and poverty percentage. The ADoE data center database was used to collect data for the bus fleet's average age. Finally, the beginning bus driver salary was

taken from the state-required information section of each school district's website or was provided by a school administrator through correspondence.

Data Collection Procedures

Collected data were compiled into a spreadsheet. The district school bus fleet's average age was calculated for each school by adding the year model of all buses owned by the school district and dividing the sum by the district's total number of school buses. The quotient was rounded to the nearest hundredth and input on the spreadsheet. Average daily membership was calculated using the 2018-2019 enrollment for the district. Transportation funding was calculated as the product of 2018-2019 enrollment and $331.20. Transportation expense, square miles of the district, and poverty percentage were input onto the spreadsheet as reported to the database. The beginning bus driver salary was identified as the shortest route available with 0 years of experience driving as found on each school district's website. When the salary chart specified an hourly rate of pay, the school district administration was contacted to determine the number of hours spent on the shortest route. Schools receiving isolated funding for transportation were excluded from the sample. The spreadsheet was then exported to IBM Statistical Packages for the Social Sciences (SPSS) Version 27 for analysis.

Analytical Methods

IBM SPSS Version 27 was used to conduct the data analysis. Data collected for all variables were continuous and rounded to the thousandths place when necessary. Multiple linear regression was used to analyze each hypothesis. The first hypothesis's predictor variables were school district poverty percentage, average daily membership, and square miles of the district. The criterion variable for Hypothesis 1 was the

percentage of transportation funded. The predictor variables for Hypotheses 2, 3, and 4 were school district poverty percentage, average daily transported, square miles of the district, and percentage of transportation funded. The criterion variable for Hypothesis 2 was the school district's transportation expense. The criterion variable for Hypothesis 3 was the average age of the bus fleet. The criterion variable for Hypothesis 4 was the beginning bus driver salary. For each hypothesis, the combination of predictor variables was analyzed first. Then, each predictor variable was examined individually for contribution to the prediction formula. A two-tailed test was used with a .05 level of significance.

Limitations

Some limitations were noted during the study. These limitations were not determined to limit the quality of the study. Communicating these limitations is essential, however, to understand the data analysis. These limitations were not noted to exceed the typical limitations involved when school districts are used for a study. The study used a regression strategy. Thus, no variables were manipulated, and subjects were not randomly assigned to treatments. Each district's data were self-reported and pulled from the state's database or school district's website. Therefore, mistakes could have been made in the self-reports that could affect the results and the analyses.

An additional limitation is created by the self-reporting of transportation expenditure data by each school district. With self-reporting, expenditure data could not be categorized into specific expenditures. Additionally, this data collection method did not allow the researcher to separate expenditures incurred by the school district for direct transportation services from expenditures incurred by some school districts for

subcontracting transportation services. Therefore, school district transportation expenditures were viewed as a whole without adjusting for the type of transportation services offered.

The data used was from the 2018-2019 school year. Due to the coronavirus disease pandemic, school districts in Arkansas used a virtual learning model as an alternative instruction method during the 2019-2020 school year. Therefore, school bus fleets did not run regular routes for the school year's final quarter. The lack of transportation expenditures for the fourth quarter would significantly affect the study results by skewing the transportation expense variable. Therefore, data from the previous school year was used to analyze the variables.

Summary

This study was designed to examine the predictive effects of school district characteristics on the ability to fund a school district's transportation needs. The multiple regression design used data obtained from databases hosted by the ADESE, the University of Arkansas Office for Educational Policy Arkansas School Data-Demographics database, the Arkansas Division of Public School Academic Facilities and Transportation, and bus driver salary data obtained from each school district’s website. Chapter IV will provide the study's statistical results, identifying characteristics most effective in predicting a school district's transportation expenditures.

CHAPTER IV

RESULTS

This study examined the predictive effects of school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public school districts. Additionally, this study explored the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on criterion variables for Arkansas public school districts. For Hypotheses 2-4, the criterion variables were school district's transportation expense as reported to the ADESE, the average age of the district's school bus fleet as an average of the school buses reported to the ADESE, and beginning bus driver salary as reported as part of the state-required information on each school district's website.

Sample data for this study included 222 of the 235 public school districts in Arkansas. School districts receiving isolated transportation funding were excluded from the study, as those 13 districts are identified as requiring additional transportation funding due to state-required school consolidations. The null hypotheses were tested using a linear multiple regression model with a two-tailed test with a .05 level of significance. The results of these analyses are further discussed in this chapter.

Hypothesis 1

The first hypothesis stated no significant predictive effect will exist between school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public school districts. Before conducting the analysis, the data were examined to determine that assumptions for multiple regression were met. The residual plots' inspection demonstrated a normal distribution meeting the assumptions of linear relationship, normality, and homoscedasticity. An examination of the intercorrelation table indicated that none of the variables in the model, percentage of poverty, average daily membership, and square miles of the district was indicative of multicollinearity. Additionally, R^2 was examined, resulting in tolerances higher than 1 - R^2 (Leech, Barrett, & Morgan, 2015). Therefore, multicollinearity was not considered problematic for the model. The assumptions of multiple linear regression were evaluated based on the residual plots. The assumption of homoscedasticity was not violated, and there is no apparent pattern within the data. The data appeared to be normally distributed, and data were equally distributed on top and bottom. The relationship between the predictor variables and the percentage of transportation funded appeared approximately linear. The means, standard deviations, and inter-correlations can be found in Table 1.

Table 1

Means, Standard Deviations, and Intercorrelations for Percentage of Transportation Funded

Variable	*M*	*SD*	1	2	3
% T. Funded	72.67	25.29	-.379***	.156*	-.320***
Pred Var					
1. Poverty	65.50	14.46	1.000	-.262***	.294***
2. ADM	2014.42	3088.62	-.262***	1.000	-.035
3. Miles^2	210.28	141.07	.294***	-.035	1.000

Note. % T. Funded = Percentage of Transportation Funded; Pred Var = Predictor Variable; Poverty = School District Poverty Percentage; ADM = Average Daily Membership; Miles^2 = Square Miles of the School District. $N = 222$.
*$p < .05$. **$p < .01$. ***$p < .001$.

To examine the fit of the regression model for predicting the percentage of transportation funded, casewise diagnostics and Cook's Distance test for influential cases were conducted. These diagnostics revealed no significant outliers within the data. After testing all the relevant assumptions and model fit diagnostics, a standard multiple regression analysis was then conducted to determine the degree to which school district poverty percentage, average daily membership, and square miles of the district predicted the percentage of transportation funded for school districts in Arkansas (see Table 2).

Table 2

Simultaneous Multiple Regression Analysis for Percentage of Transportation Funded

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	27731.72	3	9243.91	17.73	< .001
Residual	113634.13	218	521.26		
Total	141365.85	221			

Regression results indicated that the overall model significantly predicted the percentage of transportation funded for school districts in Arkansas, $R^2 = .196$, $R^2_{adj} = .185$, $F(3, 218) = 17.73$, $p < .001$. These results indicated that this model was a better predictor of the percentage of transportation funded when compared to the grand mean, and hence the null hypothesis was rejected. The model accounted for approximately 18.5% of the variance in the percentage of transportation funded for Arkansas school districts. A summary of the unstandardized and standardized regression coefficients for this model is presented in Table 3 and indicated that school district poverty percentage and square miles of the district significantly contributed to the model.

Table 3

Unstandardized and Standardized Coefficients for Predictors of % of Transportation Funded

Model	*B*	*SE*	β	*t*	*p*	Collinearity Statistics	
1(Constant)	113.69	7.70		14.76	< .001	Tolerance	VIF
Poverty	-0.51	0.12	-0.29	-4.44	< .001	.850	1.177
ADM	0.00	0.00	0.07	1.14	.256	.929	1.076
$Miles^2$	-0.04	0.01	-0.23	-3.64	< .001	.911	1.097

Note. Poverty = School District Poverty Percentage; ADM = Average Daily Membership; $Miles^2$ = Square Miles of the School District.

Of the three predictor variables, one was outside the significance level. Average daily membership contributed the least (β = 0.07) to the percentage of transportation funded in Arkansas school districts. Similarly, results from the coefficient table revealed the equation for predicting the percentage of transportation funded in Arkansas school districts as follows: Percent of Transportation Funded (predicted) = 113.69 - (0.51)(School District Poverty Percentage) + (0.00)(Average Daily Membership) - (0.04)(Square Miles of the District).

Hypothesis 2

The second hypothesis stated that no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts. Before conducting a regression analysis, the data were examined to determine that assumptions for multiple regression were met. An examination of the residual plots indicated a normal distribution, and several of the

residuals showed the data were nearly all homoscedastic. An examination of the intercorrelation table output of percentage of poverty, average daily membership, square miles of the district, percentage of transportation funded were not indicative of multicollinearity. R^2 was examined, resulting in tolerances higher than 1 - R^2 (Leech et al., 2015). Therefore, multicollinearity was not considered problematic for the model. Finally, to test the assumptions of normally distributed residuals and homoscedasticity of residuals, a residual plot was generated. An examination of this plot did not reveal violations of homoscedasticity or normality. To examine the fit of the regression model for predicting actual transportation expense, casewise diagnostics and Cook's Distance test for influential cases were conducted. These diagnostics revealed six significant outliers. The outliers were removed, and an analysis of the model was conducted again. The model produced significantly different results after the outliers were removed. Therefore, it was determined that those districts were exhibiting influence on the overall model, and it was determined that the analysis of the 216 remaining districts should be used. Table 4 provides the means, standard deviations, and intercorrelations for actual transportation expense and the predictor variables.

Table 4

Means, Standard Deviations, and Intercorrelations for Actual Transportation Expense

Variable	*M*	*SD*	1	2	3	4
T. Expense	750534.71	819914.90	-.344***	.965***	-.008	.004
Pred Var						
1. Poverty	65.63	14.52	1.000	-.416***	.320***	-.399***
2. ADM	1674.29	2012.97	-.416***	1.000	-.067	.195**
3. Miles^2	210.05	139.14	.320***	-.067	1.000	-.319***
4. T. Fund	71.55	22.16	-.399***	.195**	-.319***	1.000

Note. T. Expense = Actual Transportation Expense; Pred Var = Predictor Variable; Poverty = District Poverty Percentage; Miles^2 = Square Miles of the District; T. Fund = Percentage of Transportation Funded. $N = 216$. *$p < .05$. **$p < .01$. ***$p < .001$.

After testing all the relevant assumptions and model fit diagnostics, a standard multiple regression analysis was then conducted to determine the degree to which poverty percentage, average daily membership, square miles of the district, and the percentage of transportation funded predicted actual transportation expenses (See Table 5).

Table 5

Simultaneous Multiple Regression Analysis for Predicting Actual Transportation Expense

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	139724748246916.72	4	34931187061729.18	1531.93	< .001
Residual	4811248736405.94	211	22802126712.82		
Total	144535996983322.66	215			

Regression results indicated that the overall model significantly predicted the actual transportation expenses for Arkansas school districts, $R^2 = .967$, $R^2_{adj} = .966$, $F(4, 211) = 1531.93$, $p < .001$. These results indicated that this model was a better predictor of actual transportation expenses of Arkansas school districts when compared to the grand mean, and hence the null hypothesis was rejected. The model accounted for approximately 96.60% of the variance in actual transportation expenses of Arkansas school districts. A summary of the unstandardized and standardized regression coefficients for this model is presented in Table 6 and indicates that average daily membership and percentage of transportation funded significantly contributed to the model.

Table 6

Unstandardized and Standardized Coefficients for Predictors of Actual Transportation Expenses

Model	*B*	*SE*	β	*t*	*p*	Collinearity Statistics	
1(Constant)	594464.01	80126.57		7.42	< .001	Tolerance	VIF
Poverty	-211.64	859.50	-0.00	-0.25	.806	.681	1.468
ADM	407.75	5.65	1.00	72.15	< .001	.819	1.220
$Miles^2$	-12.09	80.38	-0.00	-0.15	.881	.848	1.180
%T. Funded	-7130.64	520.36	-0.19	-13.70	< .001	.798	1.254

Note. Poverty = School District Poverty Percentage; ADM = Average Daily Membership; $Miles^2$ = Square Miles of the School District; %T. Funded = Percentage of Transportation Funded.

Of the four predictor variables, average daily membership contributed to the model the most (β = 1.00), and poverty and square miles of the district (both at β = -0.00) contributed the least to actual transportation expenses of Arkansas public school districts. Similarly, results from the coefficient table revealed the equation for predicting actual transportation expenses as follows: Actual Transportation Expenses (predicted) = 594464.01 - (211.64)(Poverty Percentage) + (407.75)(Average Daily Membership) - (12.09)(Square Miles of the District) - (7130.64)(Percentage of Transportation Funded).

Hypothesis 3

The third hypothesis stated that no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet for Arkansas public school districts. Before conducting a regression analysis, the

data were examined to determine that assumptions for multiple regression were met. Looking at the residual plots, there appeared to be a normal distribution, and several of the residuals showed the data were nearly all homoscedastic. An examination of the intercorrelation table indicated that three of the variables in the model, poverty percentage, average daily membership, and percentage of transportation funded had a strong correlation with each other. Because these three variables had a high correlation, R^2 was examined, resulting in a tolerance lower than 1 - R^2 (Leech et al., 2015). Therefore, multicollinearity was considered problematic for the model. The choice was made to remove the variable of the school district poverty percentage from the model. The data were then examined again to determine if assumptions for multiple regression were met. Looking at the residual plots, there appeared to be normal distribution and showed the data were nearly all homoscedastic. An examination of the intercorrelation table indicated that two of the variables in the model, average daily membership and percentage of transportation funded, had a strong correlation with each other. Because these two variables had a high correlation, R^2 was examined, resulting in a tolerance lower than 1 - R^2 (Leech et al., 2015). Therefore, multicollinearity was considered problematic for the model. Furthermore, the choice was made to remove the variable of the percentage of transportation funded. The data were then examined again to determine that assumptions for multiple regression were met. Looking at the residual plots, there appeared to be non-normal distribution, but several of the residuals showed the data were nearly all homoscedastic. An examination of the intercorrelation table indicated no variables in the new model had a strong correlation with each other and no tolerance was lower than 1 - R^2. Therefore, multicollinearity was not considered a

problem with the new model. Table 7 shows the means, standard deviations, and intercorrelations for the average age of the bus fleet.

Table 7

Means, Standard Deviations, and Intercorrelations for Average Age of Bus Fleet

Variable	*M*	*SD*	1	2
Ave Bus Age	11.97	2.89	-.120*	-.042
Pred Var				
1. ADM	2014.42	3088.62	1.000	-.035
2. Miles^2	210.28	141.07	-.035	1.000

Note. Ave Bus Age = Average Age of the Bus Fleet; Pred Var = Predictor Variable; ADM = Average Daily Membership; Miles^2 = Square Miles of the District;. $N = 222$. *$p < .05$. **$p < .01$. ***$p < .001$.

To examine the fit of the regression model for predicting average age of the bus fleet, casewise diagnostics and Cook's Distance test for influential cases were conducted. These diagnostics revealed no significant outlier in the model. After testing all the relevant assumptions and model fit diagnostics, a standard multiple regression analysis was then conducted to determine the degree to which average daily membership and square miles of the district predicted the school bus fleet's average age for Arkansas public school districts (See Table 8).

Table 8

Simultaneous Multiple Regression Analysis for Predicting Average of the School Bus Fleet

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	30.57	2	15.28	1.84	.161
Residual	1814.83	219	8.29		
Total	1845.40	221			

Regression results indicated that the overall model did not significantly predict the average age of the bus fleet for Arkansas public school districts, $R^2 = .017$, $R^2_{adj} = .008$, $F(2, 219) = 1.84$, $p = .161$. These results indicated that this model was no better in predicting the school bus fleet's average age for Arkansas public school districts compared to the grand mean, and hence the null hypothesis failed to be rejected. The model accounted for approximately 0.80% of the variance in the average age of the school bus fleet. A summary of the unstandardized and standardized regression coefficients for this model is presented in Table 9. Neither of the predictor variables significantly contributed to the model.

Table 9

Unstandardized and Standardized Coefficients for Predictors of Average Age of the School Bus Fleet

Model	*B*	*SE*	β	*t*	*p*	Collinearity Statistics	
1(Constant)	12.40	0.37		33.22	< .001	Tolerance	VIF
ADM	0.00	0.00	-0.12	-1.82	.070	.999	1.001
Miles^2	-0.00	0.00	-0.05	-0.68	.495	.999	1.001

Note. ADM = Average Daily Membership; Miles^2 = Square Miles of the School District.

Neither of the predictor variables contributed significantly to the model predicting the school bus fleet's average age. Results from the coefficient table revealed the equation for predicting the average age of the school bus fleet as follows: Average Age of the School Bus Fleet (predicted) = 12.395 + (0.00)(Average Daily Membership) - (0.00)(Square Miles of the District).

Hypothesis 4

The fourth hypothesis stated that no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas public school districts. Before conducting a regression analysis, the data were examined to determine that assumptions for multiple regression were met. Looking at the residual plots, there appeared to be a normal distribution, and several of the residuals showed the data were nearly all homoscedastic. An examination of the intercorrelation

table indicated that three of the variables in the model, poverty percentage, average daily membership, and percentage of transportation funded had a strong correlation with each other. Because these three variables had a high correlation, R^2 was examined, resulting in a tolerance lower than 1 - R^2 (Leech et al., 2015). Therefore, multicollinearity was considered problematic for the model. The choice was made to remove the variable of school district poverty percentage. The data were then examined again to determine that assumptions for multiple regression were met. Looking at the residual plots, there appeared to be non-normal distribution, but several of the residuals showed the data were nearly all homoscedastic. An examination of the intercorrelation table indicated no variables in the new model had a strong correlation with each other and no tolerance was lower than 1 - R^2. Therefore, multicollinearity was not considered a problem with the new model. Table 10 shows the means, standard deviations, and intercorrelations for beginning bus driver salary.

Table 10

Means, Standard Deviations, and Intercorrelations for Beginning Bus Driver Salary

Variable	*M*	*SD*	1	2	3
Beg Bus Sal	8125.15	2033.43	.310***	-.125*	-.031
Pred Var					
1. ADM	2014.42	3088.62	1.000	-.035	.156*
2. Miles^2	210.28	141.07	-.035	1.000	-.320***
3. % T. Funded	72.67	25.29	.156*	-.320***	1.000

Note. Beg Bus Sal = Beginning Bus Driver Salary; Pred Var = Predictor Variable; ADM = Average Daily Membership; Miles^2 = Square Miles of the District; % T. Funded = Percentage of transportation funded; $N = 222$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Finally, to test the assumptions of normally distributed residuals and homoscedasticity of residuals, a residual plot was generated. An examination of this plot did not reveal violations of homoscedasticity or violations of normal distribution. To examine the fit of the regression model for predicting beginning bus driver salary, casewise diagnostics and Cook's distance test for influential cases were conducted. These diagnostics revealed no significant outlier in the model. After testing all the relevant assumptions and model fit diagnostics, a standard multiple regression analysis was then conducted to determine the degree to which average daily membership and square miles of the school district predicted the beginning bus driver salary for Arkansas public school districts (See Table 11).

Table 11

Simultaneous Multiple Regression Analysis for Predicting Beginning Bus Driver Salary

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	113625824.52	3	37875274.84	10.32	< .001
Residual	800172329.53	218	3670515.27		
Total	913798154.05	221			

Regression results indicated that the overall significantly predicted beginning bus driver salary for Arkansas public school districts, $R^2 = .124$, $R^2_{adj} = .112$, $F(3, 218) = 10.32$, $p < .001$. These results indicated that this model was a better predictor of the beginning bus driver salary of Arkansas public school districts compared to the grand mean, and hence the null hypothesis was rejected. The model accounted for

approximately 11.20% of the variance in beginning bus driver salary. Table 12 includes a summary of the unstandardized and standardized regression coefficients for this model.

Table 12

Unstandardized and Standardized Coefficients for Predictors of Beginning Bus Driver Salary

Model	*B*	*SE*	β	*T*	*p*	Collinearity Statistics	
1(Constant)	8938.09	511.44		17.48	< .001	Tolerance	VIF
ADM	0.21	0.04	0.33	5.07	< .001	.975	1.025
Miles^2	-2.25	0.96	-0.16	-2.33	.021	.897	1.114
% T. Funded	-10.62	5.44	-0.13	-1.95	.052	.876	1.141

Note. ADM = Average Daily Membership; Miles^2 = Square Miles of the School District; % T. Funded = Percentage of Transportation Funded.

Square miles of the district and percent of transportation funded made a small contribution to the overall model (β = -0.16 and -0.13), and average daily membership made a larger contribution (β = 0.33) to beginning bus driver salaries of Arkansas public school districts. Results from the coefficient table revealed the equation for beginning bus driver salary as follows: Beginning Bus Driver Salary (predicted) = 8938.09 + (0.21)(Average Daily Membership) - (2.25)(Square Miles of the District) – (10.62)(Percentage of Transportation Funded).

Summary

The multiple linear regression analyses indicated that the combination of poverty percentage and square miles of the district had a significant effect on the percentage of transportation funded. Additionally, average daily membership, and percentage of

transportation funded had a significant effect on the school district's actual transportation expense. However, the district's average daily membership and square miles did not significantly affect the average age of the bus fleet. Finally, average daily membership and square miles of the district did have a significant effect on beginning bus driver salary. The summary of results is displayed in Table 13.

Table 13
Summary of p Values for the Model with Poverty Percentage, Average Daily Membership, Square Miles of the District, and Percentage of Transportation Funded

Variables by H_o	H1	H2	H3	H4
Model	< .001	< .001	.161	< .001
Poverty	< .001	.806	-----	-----
ADM	.256	< .001	.070	< .001
$Miles^2$	< .001	.881	.495	.021
%T. Funded	-----	< .001	-----	.052

Note. Poverty = School District Poverty Percentage; ADM = Average Daily Membership; $Miles^2$ = Square Miles of the School District; %T. Funded = Percentage of Transportation Funded.

Of the four predictor variables, no single predictor contributed significantly to all the models. Chapter V contains a discussion of the results and will include the findings, the implications, and the recommendations.

CHAPTER V

DISCUSSION

This study examined transportation funding and expenditures for Arkansas public school districts through a multiple regression analysis using the Kaldor-Hicks efficiency theory. First, the researcher conducted a multiple regression analysis to determine the predictive effects of school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public schools. Second, the researcher conducted a multiple regression analysis to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts. Third, the researcher conducted a multiple regression analysis to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet for Arkansas public school districts. Fourth, the researcher conducted a multiple regression analysis to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas public school districts. Analysis and interpretation of potential applications for the results of these analyses are presented in Chapter V. Chapter V concludes with recommendations for

future research to forward the understanding of funding and finance public school transportation in Arkansas.

Findings and Implications

This study used a quantitative, multiple regression model to analyze the predictive effects of the predictor variables on the criterion variables. School district poverty percentage, average daily membership, square miles of the school district, percentage of transportation funded, school district transportation expenses, the average age of the school district's bus fleet, and beginning bus driver salary were collected for 222 of the 235 public school districts in Arkansas. The 13 school districts receiving isolated transportation funding were omitted from this study. For all four hypotheses, the significance of the whole model was analyzed. Then, each predictor variable's contribution to the model was analyzed to determine its contribution to the model.

Hypothesis 1

Hypothesis 1 stated no significant predictive effect will exist between school district poverty percentage, average daily membership, and square miles of the district on the percentage of transportation funded for Arkansas public schools. Prior to conducting the multiple linear regression analysis, data were examined to determine if the assumptions for multiple linear regression were met. The researcher determined that all assumptions for multiple linear regression were met and proceeded with the analysis. The model significantly predicted the percentage of transportation funded for Arkansas school districts. Therefore, the null hypothesis for this model was rejected. The model accounted for approximately 18.5% of the variance in the percentage of transportation funded for Arkansas school districts. The unstandardized and standardized regression coefficients

indicated that the district's poverty percentage and square miles significantly contributed to the model.

Hypothesis 2

Hypothesis 2 stated no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on a school district's transportation expense for Arkansas public school districts. Before conducting the multiple linear regression analysis, data were examined to determine if the assumptions for multiple linear regression were met. Six school districts were significant outliers affecting the overall model. The outliers were removed, and the model was conducted again. The model then produced significantly different results, demonstrating that the outliers were influencing the first model. In the second model, all assumptions for multiple linear regression were met. The researcher proceeded with the analysis. The model significantly predicted the actual transportation expense for Arkansas school districts. Therefore, the null hypothesis for this model was rejected. The model accounted for approximately 96.60% of the variance in the percentage of transportation funded for Arkansas school districts. The unstandardized and standardized regression coefficients indicated that average daily membership and percentage of transportation funded significantly contributed to the model.

Hypothesis 3

Hypothesis 3 stated no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the average age of the district's school bus fleet

for Arkansas public school districts. Prior to conducting the multiple linear regression analysis, data were examined to determine if the assumptions for multiple linear regression were met. An examination of the values on the intercorrelation table indicated that school district poverty percentage, average daily membership, and percentage of transportation funded had a strong correlation to each other. The choice was then made to remove the variable school district poverty percentage from the model. The data were examined again to determine if the assumptions for multiple linear regression were met. An examination of the intercorrelation table indicated that two of the variables in the model, average daily membership and percentage of transportation funded, had a strong correlation. The choice was made to remove the variable percentage of transportation funded from the model. The data were examined again to determine if the assumptions for multiple linear regression were met. The researcher determined that all assumptions for multiple linear regression were met and proceeded with the analysis. The model did not significantly predict the average age of the district's school bus fleet for Arkansas school districts. Therefore, the null hypothesis for this model was retained. The model accounted for approximately 0.80% of the variance in the average age of the district's school bus fleet for Arkansas school districts. The unstandardized and standardized regression coefficients indicated that neither of the variables, average daily membership or square miles of the district, significantly contributed to the model.

Hypothesis 4

Hypothesis 4 stated no significant predictive effect will exist between school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on the beginning bus driver salary for Arkansas

public school districts. Before conducting the multiple linear regression analysis, data were examined to determine if the assumptions for multiple linear regression were met. An examination of the values on the intercorrelation table indicated that school district poverty percentage, average daily membership, and percentage of transportation funded had a strong correlation to each other. The choice was made to remove the variable school poverty percentage from the model. The data were examined again to determine if the assumptions for multiple linear regression were met. The researcher determined that all assumptions for multiple linear regression were met and proceeded with the analysis. The model significantly predicted the beginning bus driver salary for Arkansas school districts. Therefore, the null hypothesis for this model was rejected. The model accounted for approximately 11.20% of the variance in the beginning bus driver salary for Arkansas school districts. The unstandardized and standardized regression coefficients indicated that the district's average daily membership and square miles significantly contributed to the model.

School District Poverty Percentage

Due to issues with multicollinearity, the district poverty percentage was excluded from the analysis of the average age of the school district's bus fleet and beginning bus driver salary. Nevertheless, the results indicated that school district poverty percentage was the highest predictor of the percentage of transportation funded for Arkansas public school districts. The findings of poverty's effect on transportation expenditures were consistent with Fox et al.'s (2019) research in North Carolina, indicating the variable of socioeconomic status of the district as a factor, demonstrating a high need for state support in funding low-income districts. The Minnesota Department of Children,

Families, and Learning, Program Finance Division (2002) recommended establishing a grant program for school districts with high transportation expenditure ratios. Arkansas' enhanced transportation funding could serve as a type of grant program for districts with high transportation expenditures. However, without an enhanced transportation funding formula, it is unknown if poverty is considered for additional transportation support (W. Cartwright, personal communication, September 21, 2020). Additionally, the results were consistent with Vincent et al.'s (2014) findings that a cross-sector approach to planning school transportation shows great promise by leading to greater operational efficiency of public resources while providing a new level of equity to help circumvent the connections between poverty level and neighborhood. With a high level of predictive effect on transportation expense, school poverty merits further research to determine the extent to which school poverty could be used in funding school district transportation.

Average Daily Membership

An examination of models in the study indicated that average daily membership was a contributing predictor variable in two of the four models, predicting school district's transportation expense and beginning bus driver salary for Arkansas public school districts. Average daily membership is the only multiplier in the Arkansas school funding formula, with a rate of $331.20 times the average daily membership ("An Act to Amend," 2019). The literature indicated that Arkansas school districts would need to increase bus driver salaries to address the school bus driver shortage (Jordan, 2020; NASDPTS, 2002; Shine, 2018). The findings indicated that average daily membership was not a significant predictor of the percentage of transportation funded by school districts. These findings supported Baker's (2014) study indicating no correlation

between funding fairness and spending fairness. The foundation funding for transportation is unrestricted ("An Act to Amend," 2019), allowing school districts the autonomy to use unspent transportation funds for other operational expenses of the school district while requiring other school districts to use their operating funds for a deficit created by transportation expenditures. For this reason, increasing the foundation funding amount multiplied times average daily membership would allow school districts to spend the additional transportation dollars in places other than bus driver salaries. Additionally, multicollinearity was problematic in this study for the variables of average daily membership, percentage of transportation funded, and district poverty percentage. Therefore, the findings of this study should be used only to indicate that average daily membership is not, by itself, a predictor of specific school transportation expenditures.

Square Miles of the School District

The study indicated that the variable, square miles of the school district, was a significant predictor for the percentage of transportation funded and beginning bus driver salary of Arkansas public school districts. These results were consistent with Ammon and Burn's (2011) study identifying three options to reduce school transportation expenditures greatly: eliminate transportation, consolidate bus stops, and change bell times. School districts with a larger area to cover through bus routes in square miles will likely spend more on transportation expenditures per student than school districts in more densely populated areas. School districts implementing the cost-saving measures identified by Ammon and Burns are likely to be met with public outcry that is much greater proportionally than the savings to the district's budget (see also Bertsimas et al., 2020).

Additionally, Alspaugh (1996) concluded that through proper transportation management, it is possible to overcome geographic factors of per-pupil transportation expenses, except for very small school districts who could not appropriately shrink their transportation expenses to a level as low as other districts. Furthermore, Rice et al. (2018) found that school districts with higher square mileage and few students acquire a higher transportation cost per student. Higher cost factors include fuel expense, longer bus routes, and maintenance of transportation equipment. The findings of this study should be used only to indicate that square miles of the school district is a significant predictor of transportation expenditures for Arkansas public school districts. However, it is not the sole predictor for transportation expenditures for Arkansas public school districts.

Percentage of Transportation Funded

The study indicated that the percentage of transportation funded was the predictor variable with the largest effect on transportation expense for Arkansas public school districts. Further, due to multicollinearity issues between the percentage of transportation funded, average daily membership, and school district poverty percentage, the percentage of transportation funded was excluded as a predictor variable for the average age of the school district's bus fleet. However, the percentage of transportation funded is vital to this study as both a predictor and criterion variable. The percentage of transportation funded is a ratio of actual expense to actual funding per district. The findings of this study were consistent with VanBeek's (2011) findings that transportation expenses were higher for more densely populated areas than they were for less densely populated areas concerning the total operating expense for the district. Examining the relationship

between actual district expenditures and actual district funding is essential to determining future funding of school district transportation.

Theoretical Framework

The use of the Kaldor-Hicks Pareto Efficiency Theory was effective in exploring the district and community effects on Arkansas public school transportation expenses. Many independent systems exist with an ideal result in the economic system containing an indefinite number of possible optimized outcomes (Hicks, 1939; Kaldor, 1939; Scitovszky, 1941). The economic system achieves optimization by creating an outcome where every part ends as well off as possible without making another part less well off. Hicks (1939) stated that conditions must be fulfilled to determine whether the organization is cohesively optimum given the infinite number of possible optimized outcomes. *Lakeview School District No. 25 v. Mike Huckabee* (2004) required Arkansas to fund school districts adequately and equitably. The examination of funding and expenditures through efficiency theory will help identify any funding deficiencies that could lead to inadequate or inequitable funding of public school districts in Arkansas.

Recommendations

Potential for Practice/Policy

This study was conducted to determine if a school district's poverty percentage, average daily membership, and square miles of the district contributed to predicting a school district's percentage of transportation funded. Additionally, the study was conducted to determine if school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded contributed to the prediction of the school district's transportation expense, the average age of the school

district's bus fleet, and the school district's beginning bus driver salary. This study indicated that some variables influence a school district's ability to provide transportation to families in their community. The AGA, policymakers, and educational leaders should understand the most efficient methods of funding transportation within the school district.

This study indicated that average daily membership was not an overall adequate predictor variable of transportation expenses, significantly contributing only to actual transportation expenses and beginning bus driver salary. However, the AGA funds school districts through a funding formula based solely on the average daily membership for the school district ("An Act to Amend," 2019). This funding formula also is not adjusted based on whether the student rides the school bus, uses private transportation, or the length of time each student spends on the school bus. To support districts demonstrating additional funding needs for school district transportation, the Arkansas BLR provides enhanced transportation funding amounts per district to the AGA. The enhanced transportation funding is then written into law, and additional funding is provided to school districts. The Minnesota Department of Children, Families, and Learning, Program Finance Division (2002) reported on school funding and recommended that the state create a small grant program for smaller districts to apply for recovery of their actual transportation expenses. This procedure is similar to and supports the need for enhanced transportation funding in Arkansas. However, a more transparent means of allocating the enhanced transportation funding should be readily available to the public to help school leaders and taxpayers alike understand why each district receives additional funding allocated by the BLR. Without a formula, compliance with the equitable

requirement of *Lakeview School District No. 25 v. Mike Huckabee* (2004) cannot be determined.

Further, Arkansas could consider a separate funding formula for transportation. By following the lead of states like Alabama by implementing a cost-based reimbursement formula for transportation (Lassiter, 2019), Arkansas could move to a more progressive funding system rewarding efficiency measures such as the purchase of more fuel-efficient buses, providing fair pay to school bus drivers, and offering an additional 10% of support to very small school districts. This model mirrors the Arkansas model for funding school transportation before the ruling in *Lakeview School District No. 25 v. Mike Huckabee* (2004) when Arkansas's school transportation funding formula was an "equalization formula" based on equalizing the value of 25 mills of local wealth. By implementing an expenditure-based formula, Arkansas could work to meet the requirements set by the courts for school funding.

Arkansas schools must spend more money to recruit and retain school bus drivers. With an established bus driver shortage, school districts must begin allocating more of their budget to increasing bus driver's salaries to ensure school bus driver salaries are comparable to other professions requiring a commercial driver's license (Jordan, 2020; NASDPTS, 2002; Shine, 2018). However, mandating school districts to increase school bus driver salaries without additional funding would subtract from the school district's operating budget, placing stress on the school district's budget. With the research indicating a strong correlation between average daily membership on both the school district's transportation expense and the beginning bus driver salary, and because bus driver salaries contribute to the school district's transportation expenditures, increasing

the foundation funding amount could increase a school district's ability to increase bus driver salaries, limiting the bus driver shortage.

Future Research Considerations

Predictive effects on the percentage of transportation funded, school district's transportation expense, the average age of the district's school bus fleet, and beginning bus driver salary for Arkansas public school districts were examined in this study. The limitations of this study should be examined through additional research as the data become available. Additionally, the researcher recommends the following considerations for future research:

1. Research should be conducted to determine the effect of enhanced transportation funding on a school district's ability to meet the transportation needs of families served by the school district.
2. Research should be conducted using the same predictor variables as this study with updated data, including expenditures associated with mandates due to the coronavirus disease pandemic.
3. Additional research on the school district's poverty percentage's effect on transportation expenditures should be conducted to determine how much of an effect the community's poverty level has on the school district's transportation expenditures.
4. Further research should be conducted to determine the extent to which school district poverty percentage, average daily membership, and square miles of the school district should be included in calculating Arkansas's transportation funding model.

5. Further research should be conducted using the predictive effects of district and community characteristics on district transportation expenses based on the Kaldor-Hicks Pareto efficiency theory.
6. Further research examining the predictive effect of the number of students using school choice and the school district's policy on transporting those students should be conducted to determine the effect of school choice on transportation expenditures.
7. Further research at the national level should be conducted to examine the current levels of transportation expenditures.
8. Further research at the national level should be conducted to examine the efficiency of transportation funding by funding model.
9. Additional research of average daily membership's predictive effects on school district transportation expenditures should be conducted to determine if average daily membership should be the only variable consideration of funding transportation in Arkansas.
10. Further research should be conducted to determine the extent to which square miles of the school district should be considered to calculate school district transportation funding.
11. An examination of the causal relationships among the variables of this study should be conducted.

Conclusion

This study was conducted to determine the predictive effects of school district poverty percentage, average daily membership, and square miles of the school district on

the percentage of transportation funded for Arkansas public school districts. Additionally, this study was conducted to determine the predictive effects of school district poverty percentage, average daily membership, square miles of the district, and percentage of transportation funded on transportation expense, the average age of the school district's bus fleet, and beginning bus driver salary for Arkansas public school districts. Chapter V is a summary of the findings and implications for the four hypotheses. No single predictor variable significantly predicted the criterion variables in all four models. Three of the predictor variables, school district poverty percentage, average daily membership, and square miles of the school district, each significantly predicted two of the four hypotheses. Using Kaldor-Hicks Pareto efficiency theory, this research contributed to the body of research of school transportation expenditures to better understand district and community characteristics and their effect on school district transportation expenses.

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