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Vikram Bishnoi April 18, 2011

The Effect of California Proposition 13 and Similar Education Finance Reforms on Public and Private School Enrollments

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Abstract

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How public schools should be properly funded has long been a debated subject. Whether solely local and municipal governments should fund public school education or whether state and federal governments should aid the schools has been a particular issue for the state of California. With the passage of State Amendment Proposition 13 (1978), California saw a shortfall in overall funding towards its public schools and a sharp decline in spending-per-pupil due to a lower collection of the state property tax. This paper examines resulting changes in public and private school enrollments in California through a difference-in-difference approach with neighboring states, Oregon and Arizona, and their corresponding school financing reforms. Evidence suggests that Proposition 13 did result in increased private enrollment relative to public enrollment whereas control groups Arizona and Oregon did not, although there were decreasing total and per-pupil education expenditures post-legislation for each of the three states.

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Introduction

The California public school education system is the most populous in the United States with approximately 6.3 million students as of the 2007-08 school year, dwarfing the next largest state, Texas, by nearly 1.3 million. The state has faced multiple challenges including having the highest percentage of English learners in the nation and being near the top of the country in proportion of children living in low-income families. One of the greatest struggles the state has had to face is its heavy decline in school funding and staffing levels which lag behind a number of other states ("Comparing California" 2011).

This is particularly notable in how much the state spends educating each student, the level of per-pupil spending, has fallen dramatically relative to other states over the past 40 years. In 1965, California ranked 5th in the country in this category and in 1978 it was ranked 14th out of all 50 states (""Prop 13's Impact On Schools" 2010). After 1988, the state fell below the national average and has plunged further, and as of March 2010 is ranked 43rd in the country, when adjusted for variation in regional salaries for public school employees using the Comparable Wage Index ("Comparing California" 2011).

To gain a better understanding of why there was such a sharp decline in California's per-pupil spending, a brief understanding of California's budget policy for education is necessary. Originally, California relied heavily on the state property tax to fund local school districts, meaning that local districts' taxes were going directly to the public schools within them. However, with the state Supreme Court case, *Serrano v. Priest* (1971) it found this property tax based finance system unconstitutional as it violated the equal protection clause due to variances in funding between lower and higher income areas. This led the state to specify revenue limits

for each district in an attempt to equalize expenditures across districts. *Serrano v. Priest* and several subsequent rulings set up the passage of California State Amendment Proposition 13 and ultimately the state setting control of how tax receipts would be allocated to schools within each district. Proposition 13 lowered state property taxes by stating that the "maximum amount of property tax levied cannot exceed 1% of the full cash value of the property". The amendment restricted annual increases in assessed home value at the time of purchase to an inflation factor that would not exceed 2% each year. Previously due to a rising period of inflation and increasing home prices, property reassessments increased property taxes to such a high level that some retired people could no longer afford to remain in homes they had purchased long before. After Proposition 13, any reassessment of the property to full market value would only occur when the property was sold to another homeowner. Shortly after its passage, county property tax revenues dropped from $10.3 billion in 1977-78 to $5.04 billion in 1978-79 and forced many local governments into fiscal crisis. To combat this, in the first two years following Proposition 13 there were required legislative "bailouts" to offset property tax revenue losses ("California Property Tax: An Overview" 2009).

Ultimately, Proposition 13 led to California school districts receiving a portion of the property tax collected as well as direct payments from the state. A decade later in 1988, Proposition 98 was passed requiring the state to devote a certain amount of its general funds to K-14 education and called for an annual increase in education expenditure. Through this explicit requirement, the amendment limited the flexibility of California's budget. With these two amendments, school finance in California has been centralized at the state level and school districts are now passive recipients of state revenues.

In addition to these modifications in allocating funds towards public education, California has experienced a vast change in demographics over the past 40 years. As of 2008, California was the largest state in the nation with over 36 million residents, nearly twice its population in 1970. The state has seen a decline in its percentage white population and an influx in its minority representation through a growth in both its Asian and Hispanic populations relative to other groups. The rapid immigration during this time period has led California to become a minority-majority state, as it has less than a 50% white population with non-Hispanic whites making up only 41.7% of the population, as of 2009. This rapid change has taken its toll on California's public school system, as the state has more students than any other, a very diverse set of students, more English learners than any other state, and a large number of students from low-income backgrounds ("Comparing California" 2011). Together along with changes in education finance, the corresponding effects on enrollments in both public and private schools in the state can be determined.

This study examines the results of several states' school financing reforms on each state's private enrollments relative to its public enrollments (private/public ratio) and education expenditures. California and its education finance legislation, Proposition 13, is used as the treatment group, while the control groups are Arizona and Oregon as well as their respective education financing reforms, the Arizona equalization formula and Ballot Measure 5. It is determined that California exhibits an increase in its private/public ratio supported by a decline in both total and per-pupil education expenditures and a decline in the differentials between the state's higher and lower spending counties post-legislation. However, Arizona and Oregon actually see a decline in their ratios, which is not supported by significant declines in

expenditures. Thus, the California legislation had a significantly different effect on enrollments than similar policies in the other two states.

Prior Literature

There are several other studies that have investigated the effect of California Proposition 13 and its corresponding effect on household mobility; whether or not the amendment was the cause behind increased "lock in" or tenure in homes. In addition, a few studies have addressed Proposition 13's impact on education. Their focus investigates whether the legislation had an effect on public school students' performance and as will be discussed in this paper, whether similar school finance reforms actually allowed for greater switching to private schools.

Wasi and White's *"Property Tax Limitations and Mobility"* determined that Proposition 13 had an effect on the average tenure length of owners and renters in California as tenures increased by approximately 1 year and 0.8 years respectively from 1970-2000. The paper also found that African-Americans responded more so than other races to this "lock-in" effect and that on average owners in coastal cities with higher Proposition 13 subsidies (the savings compared to if the house were taxed at full market value) had increased tenure than those in inland cities where Proposition 13 subsidies were significantly less (Wasi and White 2005). This makes sense because when ownership changes, the value of the home is assessed based on the current property's market value, giving the homeowners greater incentive to stay in their current home. As long as property values increase by more than 2% per year, taxes are lower than they would normally be on a different house of the same value, as dictated by Proposition 13.

Nagy's study, "*Did Proposition 13 Affect the Mobility of California Households?*" emphasized that the decline in mobility in California during the period anteceding Proposition 13,

may have simply been a part of a national decline in mobility. Nagy utilized the Census Bureau's Annual Housing Surveys (1975, 1978, and 1982) and a group of pooled Standard Metropolitan Statistical Areas to conclude that the decline in mobility in the state was concurrent with that of the rest of the nation (Nagy 1997). Unlike Wasi and White's paper, which takes into account Census data from 1970-2000, Nagy only looks into the lock-in effect a few years after the passage of Proposition 13. He neglects the long-term effect of the legislation and the possibility that there was actually less mobility over a lengthened period of time.

When looking at the legislation's impact on education, Downes's "*Evaluating the Impact of School Finance Reform on the Provision of Public Education"* used two cross-sections of California public school districts, one prior to and one after the enactment of the second *Serrano v. Priest* ruling (1976) to illustrate a convergence across school districts in per-pupil expenditures. However, the study does not see a complementary convergence in student performance and considers possible explanations behind the stability in this area. It is determined that actions by wealthier districts offset the finance reforms post-ruling and changing demographics in the poorer districts account for this stability in performance (Downes 1992).

Finally, Downes and Schoeman's "*School Finance Reform and Private School Enrollment: Evidence from California"* discusses whether the passage of Proposition 13 has resulted in greater switching to private schools. The paper utilized observations from 223 school districts across the state in 1970 and 1980 as well as private school characteristics and several demographic variables. Downes and Schoeman questioned previous work on the subject and noted that prior models had failed to consider the important determinants of demand for education, which led to an understatement of the reform's effects. Through the use of school-

district specific fixed effects, the pair examined similar finance reforms in New Mexico, Minnesota, Washington, among others. They determined that the *Serrano* decisions and Proposition 13 accounted for a sizable portion of the growth in private school enrollments. This study will build on these conclusions regarding California Proposition 13 by accounting for corresponding changes in total and per-pupil education expenditure and expenditure differentials between counties, in comparison with similar legislation in Arizona and Oregon. A broader time span will be utilized, with data collected from 1970 until 2008, to determine whether similar conclusions can be drawn when applied to more recent education finance reforms.

Tiebout Model/Theory

The Tiebout Model provides clarity regarding the government provision of public goods and the key differences that set it apart from the market for private goods. Tiebout said that the key factors missing in the public goods market are *shopping* and *competition*. In this context, shopping mean that if a firm provides an inferior private good relative to its competitors, consumers will purchase from the competitors rather than the firm. This increased competition will allow for greater efficiency in a perfectly competitive private goods market. When applied to the case of public and private school education, public schools are a public good being provided at the local level by towns and cities (and to some degree the states). Competition here will arise as Tiebout says individuals can "vote with their feet" by moving to the next town over to attend its public schools (Tiebout 1956). Thus, mobility arises as a new preference revelation device with certain exceptions: whether or not individuals are able to move, whether they have access to perfect information such as on benefits received from the local municipality and taxes paid, and whether they are able to freely choose among alternatives to match their tastes for

public goods. Essentially, Tiebout's model says that since schools are provided at the local level, this threat of exit can induce efficiency (Gruber 2009).

In considering the Tiebout Model's application to public and private school education, it's important to consider whether mobility towards private goods has resulted in similar efficiency. In the case of California's Proposition 13, the sharp decline in property taxes heavily affected spending-per-pupil in California and education financing was pushed to the state-level resulting in redistribution financing. The effects of this decreased funding were indeed felt; one example was in San Jose, a once prosperous area that had to cut its public school education services dramatically shortly after Proposition 13 was enacted. The district laid off teachers in its elementary schools, cut bus transportation, and shortened the school day, yet ultimately declared bankruptcy in 1983, becoming the first American public school system to do so in forty years (Gruber 2009).

Applying the Tiebout Model to this study, it can be hypothesized that if a region experiences a decrease in expenditure allotted to its schools, similar to many of these financing reforms, residents can "move with their feet". Although there are indeed some restrictions to the model as this movement is not always feasible, residents have alternatives in the consumption of a good like education. According to the Tiebout hypothesis, poorer school districts would have fewer families that really care about education or the ability to move to support their preferred tastes for education, while the opposite would be true for wealthier school districts. Through an equalization policy and redistribution of funds towards school districts, residents would continue to "move with their feet" to achieve their preferred tastes. Mobility towards private education would likely occur after such an equalization policy where a previously wealthier school district is now receiving less education expenditure. Conversely, if a poorer district is receiving greater

education expenditure, students previously in private schools could shift towards consumption of public school education likely due to the higher quality of education perceived by greater expenditure. These differentials between higher and lower expenditure-receiving counties is examined in the study as well as the resulting shifts in the private/public ratio to support the Tiebout Model's hypothesis.

Data

The data compiled include both county-level and state-level data for the treatment group, California, as well as our control states, Arizona and Oregon. This included public and private enrollments, demographics including race, age, and gender, consumer price index information to adjust for changes in inflation, home price index, education expenditures, and income information on an annual basis from 1970 to 2008. This period of time allows for a broad enough window to evaluate each of the various school finance reforms and account for the differences between each.

Both public and private school enrollment numbers for California were provided through the state's Department of Education. Through the California Basic Educational Data System (CBEDS) California has reported enrollment numbers for its public school districts since the 1949-50 school year, and when compiled together, these numbers provide county and state-level totals. California's private schools that serve elementary or high school students are required by state law to file an affidavit each year after which the Department publishes statistics on these schools, including their enrollment numbers by county, provided back to the 1983-84 school year. It is important to note that since the 1990-91 school year, due to legislation, the directory has only included schools with six or more students. This was due to the passage of Senate Bill

899 (SB 899), which prohibits the California Department of Education from expending funds to compile information on schools with five or fewer students. This would understate California's private enrollment to some degree. However since this only takes place after 1990, these enrollment numbers would still allow for a fair assessment of the change in private to public school enrollments both prior to and after Proposition 13 was enacted in 1978.

To obtain enrollment data prior to 1983, the Digest of Education Statistics provided public and private school enrollment numbers from 1970-1980 annually for each of the three states. The data for Arizona and Oregon public school enrollment statistics were also provided through the National Center for Education Statistics's (NCES) Common Core of Data, a national statistical database that collects both fiscal and non-fiscal data about all public school districts in the United States from the 1987-88 school year onwards. The NCES provides the Private School Survey (PSS), which has collected data on private elementary and secondary schools on a bi-annual basis since the 1989-90 school year. The PSS in combination with the Digest's information were used to determine total enrollment numbers for counties in both Arizona and Oregon, and to calculate each state's private/public ratio.

Demographic variables including total population for the state and county as well as population by age group, gender, and race were given by the Center for Disease Control's (CDC) Wonder Database. The database contains April 1st United States Census counts for 1970, 1980, 1990, 2000, July 1st intercensal estimates for years 1971-1979 and 1981-89, and the July 1st postcensal estimates for 1991-1999. For 2000-2008, the population estimates utilized were produced by the US Census Bureau in collaboration with the National Center for Health Statistics (NCHS).

The U.S. Department of Commerce's Bureau of Economic Analysis database provided both personal income per capita and average wage per job on the state and county levels. Per capita personal income was calculated using the Census Bureau midyear population estimates and these dollar estimates were in current dollars (not adjusted for inflation). Average wage per job were computed using employment estimates (not by a population count). It is important to note that people holding more than one job were counted in the employment estimates for each job that they held.

The Freddie Mac House Price Index/Conventional Mortgage House Price Index (FMHPI) was utilized to gauge a measure of home prices and values from 1970 to 2008. FMHPI provides a measure of typical price inflation for homes within the U.S. with values being calculated monthly, based on a database of loans purchased by either Freddie Mac or Fannie Mae. Values were calculated monthly and the December values for each year were used (for example, if the year was 1975, the FMHPI given would be for December 1975). Since series were only available at three levels of geographical aggregation: Metropolitan Statistical Area (MSA), state, and national, at the county-level, FMHPI was based on the county's corresponding Metropolitan Statistical Area as defined by the U.S. Census Bureau.

In understanding how these school finance reforms impacted levels of enrollment, state and county-level total education expenditures were essential. Through the use of an internal file of the US Census Bureau, which collected the periodic censuses of governments and annual surveys of government, finance statistics were provided in current dollar amounts. The Bureau of Labor Statistics's CPI Index for all goods, as reported in the Economic Report of the President, was used to adjust education expenditures in each state. Dividing education expenditure by this

CPI Index, allowed for a common measure in terms of 2008 United States Dollars. These adjusted total education expenditures could then be controlled across the states by dividing by the total number of public school students per state, giving the adjusted education expenditure per pupil.

Control Groups – Arizona and Oregon

Arizona was selected as a control group, as the state uses a similar formula to California in ensuring that each school district has an equitable amount of funding. A major portion of the state's school district financing comes from local property taxes as well. However, unlike Proposition 13, property taxes are levied at "assessed value", and used in combination with an assessment ratio to determine taxes in each district. In 1980-81, the Arizona Legislature refined the school finance system to provide equal dollars per weighted pupil for school district operations through a balancing of the local qualifying property tax rate and state and county equalization assistance. This concept, commonly referred to as the "equalization formula", allowed school districts throughout Arizona to experience similar effort in raising educational dollars for their students "irrespective of the property valuations within their boundaries" ("School Finance Primer" 2007).

Other education measures have followed as a result of the equalization formula. In 1994, the Arizona Supreme Court ruled that the state's statutory formula for funding school facilities and equipment violated the Arizona Constitution. A four-year struggle to create a new capital finance system ended on July 9, 1998 when the legislature passed and approved Students FIRST (Fair and Immediate Resources for Students Today). Students FIRST created a completely new capital financing system, more tightly controlled the capital funding in the state, and established

minimum adequacy standards for school facilities ("School Finance Primer" 2007).

In addition, Oregon exhibited similar characteristics to both California and Arizona such as a rapidly growing population and changing demographics. The state had also undergone similar property tax measures that influenced public education revenue collected. Today, the money to support K-12 public education comes from several sources. The bulk of revenue comes largely from the state income tax and Lottery Funds, as well as local revenues, property tax, and Federal Funds. In 1990, Oregon voters passed Ballot Measure 5 in the November general election. This legislation directly amended the Oregon Constitution by placing a limit of $15 per every $1,000 of a property's assessed real market value on revenue collected for public education, which was later lowered to $5 ("Oregon Blue Book" 2011). Much as Proposition 13 had, Measure 5 transferred the responsibility for school funding from local governments to the state since the property tax allotted to education was significantly lowered.

In response to Measure 5, in 1991 the Oregon Legislature passed a permanent K–12 equalization formula, which determined how much money each school district would get from the "State School Fund to fill the gap between the district's local revenue and its equalization target." Soon after in 1996, voters passed Ballot Measure 47, which limited the growth of a property's assessed value to a 3% maximum per year. In 1997, Measure 50 followed which confirmed Measure 47's growth in assessed value of homes and limited the adjustments in property tax assessments. Ultimately, the effect of all these property tax measures was to shift the bulk of public school funding from local property taxes to Oregon's general fund ("Oregon Blue Book" 2011).

Empirical Models

The empirical models utilized determine the relationship between the effects of education finance legislation and other variables on enrollments in public and private schools in both the treatment group of California and the control groups, Oregon and Arizona. Dummy variables were employed for different policy changes: California Proposition 13 (1978), the enactment of the Arizona equalization formula (1980), and Oregon Measure 5 (1990). Adjusted education expenditures and differentials between counties in each state were also used as dependent variables in several OLS regressions to determine their relationship with different states' school finance reforms.

To gauge the changes in public and private enrollments for each of the states, the ratio of total private to total public school enrollments (private/public ratio) was utilized as the dependent variable in the first model, a simple OLS regression (see Table 4, appendix, page 28). Dummy variables were used for each of the states: California, Arizona, and Oregon, along with dummy variables for each state's respective education finance legislation to gauge the impact of each on shifts in public or private enrollment. The year variable adjusts across the time period from 1970-2008, when these observations are taking place. There are a number of demographic variables that come into play and also affect enrollment numbers such as certain age groups (school-aged children ages: 5-9 and 10-14), race, and gender variables, along with personal income, home price inflation, and the adjusted spending per-pupil (see Table 1 for a description of the variables, appendix, page 25).

<u>Model (1) – Private/Public Enrollment Ratio</u>

private/public = f(year, ca, or, az_equalization, proposition_13, or_measure_5, population, 5-9yrs, 10-14yrs, am_ind_pct, asian_pct, black_pct, white_pct, malepct, fmhpi, educ_expend/pupil, personal_income)

$$private/public = \beta_1*year + \beta_2*ca + \beta_3*or + \beta_4*az\_equalization + \beta_5*proposition\_13 + \beta_6*or\_measure\_5 + \beta_7*population + \beta_8*5\text{-}9yrs + \beta_9*10\text{-}14yrs + \beta_{10}*am\_ind\_pct + \beta_{11}*asian\_pct + \beta_{12}*black\_pct + \beta_{13}*white\_pct\ \beta_{14}*malepct + \beta_{15}*fmhpi + \beta_{16}*educ\_expend/pupil + \beta_{17}*personal\_income + \varepsilon$$

The second empirical model encompasses changes in total expenditure (adjusted for inflation using the CPI) both prior to and post education finance reforms (see Table 4, appendix, page 28). This model regressed total adjusted expenditure against the state dummy variables, a number of demographic variables, and the dummy variables related to each state's finance reform legislation as shown below.

Model (2) – Adjusted Education Expenditure

$$educ\_expend = \beta_1*year + \beta_2*ca + \beta_3*or + \beta_4*az\_equalization + \beta_5*proposition\_13 + \beta_6*or\_measure\_5 + \beta_7*population + \beta_8*5\text{-}9yrs + \beta_9*15\text{-}19yrs\ \beta_{10}*am\_ind\_pct + \beta_{11}*asian\_pct + \beta_{12}*black\_pct + \beta_{13}*white\_pct + \beta_{14}*fmhpi + \beta_{15}*personal\_income + \varepsilon$$

The third model was similar to the previous total expenditure regression, yet was in terms of total public school students in each state and then adjusted for inflation using the CPI (see

Table 4, appendix, page 28). This is commonly referred to as per-pupil expenditure. This dependent variable was regressed against the state dummy variables, the education finance reforms, and the demographic variables shown below.

Model (3) – Adjusted Education Expenditure Per Pupil

$$educ\_expend/pupil = \beta_1*year + \beta_2*ca + \beta_3*or + \beta_4*az\_equalization + \beta_5*proposition\_13 + \beta_6*or\_measure\_5 + \beta_7*population + \beta_8*5\text{-}9yrs + \beta_9*10\text{-}14yrs + \beta_{10}15\text{-}19yrs + \beta_{11}*am\_ind\_pct + \beta_{12}*asian\_pct + \beta_{13}*black\_pct + \beta_{14}*white\_pct + \beta_{15}*personal\_income + \varepsilon$$

In addition, to gain an understanding of legislation changes and the resulting response in education expenditure levels on a more micro-level basis, a percentile difference approach was used between counties in each state. The difference in county-area education expenditure between both the 75th and 25th percentile counties along with the 90th and 10th percentile counties were calculated (see Figures 3 and 4, page 30) and used as the dependent variable in the final set of models (see Table 4, appendix, page 28).

Models (4) and (5): Percentile Differences in County Expenditure

$$10\text{-}90\%educ\_cnty = \beta_1*year + \beta_2*ca + \beta_3*or + \beta_4*az\_equalization + \beta_5*proposition\_13 + \beta_6*or\_measure\_5 + \beta_7*population + \beta_8*5\text{-}9yrs + \beta_9*10\text{-}14yrs + \beta_{10}15\text{-}19yrs + \beta_{11}*black\_pct + \beta_{12}*white\_pct + \beta_{13}*fmhpi + \varepsilon$$

$$25\text{-}75\%educ\_cnty = \beta_1 * year + \beta_2 * ca + \beta_3 * or + \beta_4 * az\_equalization + \beta_5 * proposition\_13 + \beta_6 * or\_measure\_5 + \beta_7 * population + \beta_8 * 5\text{-}9yrs + \beta_9 * 15\text{-}19yrs + \beta_{10} * black\_pct + \beta_{11} * white\_pct + \beta_{12} * fmhpi + \varepsilon$$

Results

By observing and comparing the results of all the different model specifications, it is possible to see the relationships between public and private enrollments, education expenditures, percentile differences in county expenditures, and the different variables included in each specification.

Model (1) shows the relationship between the private/public ratio, the education finance reforms enacted in Arizona, California, and Oregon, age groups: 5-9 years and 10-14 years, as well as a number of demographic variables including race and gender, FMHPI, adjusted education expenditure per public school student, and personal income per capita. This model indicates a significant relationship between the private/public ratio and several variables. First, there is a positive relationship between the year variable and the private/public ratio. Across time, there is an overall trend towards an increase in private enrollments relative to public. With the passage of the Arizona Equalization formula in 1991, California's Proposition 13 in 1978, and Oregon's Measure 5 initiatives, each had a significant impact on the direction of the private/public ratio. However, what's interesting to note is that the Arizona equalization formula and Measure 5 (negative relationships) move in opposite directions from Proposition 13 (positive relationship).

There are several other significant variables in Model (1), population and the age groups: 5-9 years and 10-14 years vary significantly with the private/public ratio. The percentage of American Indian/Native Americans is insignificant; however the percentage of Asian and White both hold positive relationships, while the percentage Black is a strong negative relationship. Finally, we can see that FMHPI holds a positive relationship with the ratio, while education expenditure adjusted per pupil and personal income are statistically significant yet both are negative. The r-squared value says that this model explains 99.52% of the data, which is extremely high and accounts for much of the variation in the private/public ratio.

Model (2) describes adjusted education expenditure and details the relationship between this dependent variable as well as the three finance reforms, several demographic and race variables, the FMHPI, and personal income. Here we see that the passage of Proposition 13 is statistically significant and holds a strong negative relationship with adjusted education expenditure. On the other hand, the Arizona equalization formula and Oregon Measure 5 hold negative relationships with the expenditure variable, yet neither is significant. Both population and the age group 15-19 years hold strong positive relationships with education expenditure across states. When taking a look at our race variables, we see that the coefficients on the percentage of American Indian/Native American and Black populations are both strong negative relationships meaning that as these percentages increased there was actually a shortfall in adjusted education expenditure. Meanwhile, the White variable proved to be statistically insignificant. The percentage Asian population, which was rapidly increasing in each of the states during this time period, held a strong positive relationship with adjusted education expenditure likely explained by the rise in total population. The home price index (FMHPI) showed a somewhat strong positive relationship with adjusted expenditure, while personal

income, which was strongly significant, held a negative relationship with expenditure. This model had an adjusted R-squared that explained 99.66% of the data.

When adjusting education expenditure per public school student in Model (3), there were fewer statistically significant variables. When looking at the coefficients on the three education finance reforms, only the passage of Proposition 13 was statistically significant and after 1978, there was a decrease in the dependent variable. When comparing this with the legislation in Arizona and Oregon, we can see the neither was significant although Arizona holds a positive relationship and Oregon a negative one. In terms of the demographic variables, the age group 15-19 years and the percentage Asian population are both statistically significant, similar to the results from Model (2). The variable, personal income holds a somewhat strong negative relationship with the adjusted per-pupil expenditure. This model is to some degree weaker than Model (2) as the adjusted R-squared indicates that the model only accounts for 85.73% of the variation in the data.

Models (4) and (5) consider the differences between each state's highest and lowest performing counties in terms of adjusted education expenditure. This differential is accounted for by the legislation in each of the states, the set of demographic variables including school-aged groups and race, as well as changes in the home price index. Both Models (4) and (5) had high-adjusted R-squared values of 99.16% and 99.72%, respectively, accounting for much of the variation in the data. In Model (4), only Proposition 13 was statistically significant similar to the previous two models. The passage of the amendment held a strong negative relationship with the 10^{th}-90^{th}-percentile differential, meaning that after its passage this differential was largely reduced. Both the Arizona and Oregon legislation exhibited similar coefficients yet were not

statistically significant. In Model (5), we see the same case for the 25^{th}-75^{th}-percentile differential, as only Proposition 13 is significant.

The total population variable in Models (4) and (5) held a strong positive relationship with the percentile differentials, indicating that with increased population in each of the states the differential would grow. When looking at the age group variables, the variable 5-9 years held a strong negative relationship across both models, while the age group 15-19 years (primarily high-school aged students) held a strong positive relationship with the percentile differentials. In Model (4), the age group 10-14 years was significant as well exhibiting a similar positive relationship as the 15-19 years variable. The only significant race variable in these two models was the percentage White population. This variable exhibited a strong negative relationship with both percentile differentials, indicating a higher White percentage population in the state would denote lower differences in education between these high and low spending counties.

Through the combined use of models (1), (4), and (5), clearly the passage of Proposition 13 held strong implications for movements in private and public enrollments in California when taken in comparison to Arizona and Oregon. There is a strong positive relationship between the passage of Proposition 13 and the private/public ratio in Model (1), an increase in private school enrollments relative to public schools. The model indicates an opposite shift for both the Arizona equalization formula and Oregon Measure 5 initiatives, a decrease in private school enrollments relative to its public schools, when controlled for the other variables.

However, after looking at models (2) through (5), which document expenditure relative to each of the education finance reforms, there is greater evidence to support that the passage of California Proposition 13 had a different effect than these other reforms. Each of these regressions indicate negative relationships in terms of total and per-pupil education expenditure,

as well as a narrowing differential between counties at the 10^{th}-90^{th} percentile and 25^{th}-75^{th} percentile. However, coefficients for education finance reforms in both Arizona and Oregon were not significant for the adjusted expenditure and percentile differential regressions.

Total state population had a negative relationship with the private/public ratio, resulting in increased total expenditure and greater percentile differentials in education expenditure between high and low spending counties. Each of the school-aged groups had a varying effect on both the private/public ratio and expenditures. The growth in both age groups 5-9 years and 10-14 years had similar effects as population on the private/public ratio, yet had opposing coefficients when regressed against percentile differentials in education expenditure. Race variables also had varying effects. The growing percentage Asian population in each of these states had an impact on the movement towards private schools as there was a positive relationship with the ratio, similar to the White variable. Conversely, the growth in the percentage Black population indicated a decrease in the private-public ratio.

The home price index (FMHPI) varied positively with both the movement towards private schools and adjusted education expenditure. Since property taxes were allocated towards education expenditure in each of these states, increases in home prices would have a corresponding effect through increased education expenditure. Adjusted expenditure per pupil varied negatively with the private/public ratio as increased expenditure likely shifted movement towards public schools over private. Finally, the personal income variable held a negative relationship with both the private/public ratio and adjusted education expenditure, indicating that greater levels of income actually indicated increased movement towards public schools as well as decreased education expenditure.

Discussion and Conclusion

The Tiebout Model predicted that individuals can essentially "vote with their feet" to match their tastes for consumption of public goods, such as education. Through an empirical analysis of several education finance reforms in the states of Arizona, California, and Oregon, there has been a corresponding movement towards consumption of private education as a result of the decline in property tax revenues collected and allocated towards public school education in each state. However, as evidenced in the study, the shifts in private enrollment relative to public enrollment varied between the treatment group, California, and the control groups, Oregon and Arizona. This is evident through a jump in private school enrollments relative to public school enrollments (shown in the private/public ratio) post-California legislation, Proposition 13, whereas the regression models indicate a decline in the private/public ratio after Oregon Measure 5 and the enactment of the Arizona equalization formula.

Yet, to fully understand these shifts in enrollment, education expenditure must be taken into account as well. Sharp changes in education expenditure would result post-legislation as each of these three measures had a clear impact on school financing. Per-pupil expenditure was also important, as increases in this type of expenditure would have likely shifted movement towards public schools versus private schools. Post-legislation there were clearly fluctuations in the levels of per-pupil expenditure and private/public ratio for each of the states.

Based on the results in this study, California clearly saw a greater shortfall in its adjusted education expenditure as well as adjusted per-pupil expenditure. Proposition 13 did prove to be an effective equalization measure as it narrowed the gap between its highest and lowest spending counties evident in the data between the 10-90th and 25th-75th percentile counties. In both Arizona and Oregon, changes in adjusted expenditure per-pupil and differentials in expenditure pre and

post-legislation were much smaller than that of California and not statistically significant. In comparing the three, the greater shortfall in education expenditure in California may have been the reason behind this increased movement towards private education. On the other hand, in Arizona and Oregon greater equalization between school districts may have been the reason behind different shifts in public and private enrollment, namely the movement towards public schools post-legislation. It is important to note that Oregon's legislation, Ballot Measure 5, was more similar to Proposition 13 in its limits placed on the state property tax and amounts allocated towards education expenditure. Yet, in enacting an equalization formula much like Arizona's 1980 policy the state experienced a different shift in enrollments.

Clearly, school finance reforms that sought to equalize education funding had different effects across states. California Proposition 13 intended to equalize funding across counties and school districts, which it was indeed successful in doing, as indicated by the decrease in percentile differentials between county's education expenditures. The shortfall in property tax revenues that resulted did indeed have an effect on expenditures provided to public schools through lower total and per-pupil expenditure. California's subsequent increase in private enrollment was the result of this shortfall and after the required legislative "bailouts" to offset property tax revenue losses, this may have resulted in a decrease in the private/public ratio through the later half of the 1980s.

In both Oregon and Arizona, there were decreases in county percentile differentials of education expenditure although these were found to be insignificant. The empirical models suggested that for these two states post-legislation. there would not be a corresponding increase in private to public enrollments, but rather a decline. While for Arizona this decline is clearly

seen after its equalization formula in 1980, Oregon actually saw an increase in its private/public ratio after 1990 (see Figure 1, page 29). Its negative coefficient would have likely resulted from the controls for population and other demographic variables, which were rapidly changing during the decade. In both Arizona and Oregon, their respective reforms called for a redistribution of education expenditure funds across the states and instead students that had typically attended private schools would move towards public schools in districts where expenditure had typically been lower. This evidence is supported by the relationship between personal income and the private/public ratio. Students who could typically afford to attend private schools could move or "shop" across districts and be able to attend public schools (that received a greater expenditure amount) to match their tastes in education.

Thus, this study confirms the Tiebout model's application towards public and private school education as a result of a shift in policy with different outcomes across states. In California, Proposition 13 induced residents to move towards the consumption of a private education instead of public, likely due to the decreased total and per-pupil education expenditure post-legislation. In Arizona and Oregon, there was actually in increase in consumption of public education likely due to a greater equalization and lower decrease in expenditure post-legislation, although these relationships were not found to be statistically significant. Proposition 13 thus significantly differed from these types of legislation in terms of its effect on private to public enrollments.

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Appendix

Table 1: Description of Variables

Variable	Description
state_code	1 = Arizona 2 = California 3 = Oregon
ca	Dummy Variable equal to 1 if California, 0 if Oregon or Arizona
az	Dummy Variable equal to 1 if Arizona, 0 if Oregon or California
or	Dummy Variable equal to 1 if Oregon, 0 if Arizona or California
year	For school year, e.g 1979-80, the year would be 1979
population	Total population in the state for that year
private_enroll	Enrollment in the state's private/nonpublic schools for that year
public_enroll	Enrollment in the state's public schools for that year
private/public	Ratio of private to public schools in the state
am_ind	Total American Indian/Alaska Native population in state
am_ind_pct	Percentage of state that is American Indian/Alaska Native
asian	Total Asian/Pacific Islander population in state
asian_pct	Percentage of state that is Asian/Pacific Islander
black	Total Black/African-American population in state
black_pct	Percentage of state that is Black/African-American
other	Total Other/Unknown/Missing population in county
other_pct	Percentage of state that is Other/Missing/Unknown
multiracial	Total Multiracial population in state
multiracial_pct	Percentage of state that is Multiracial
white	Total White population in state
white_pct	Percentage of state that is White
5-9yrs	Total population aged 5-9 years
10-14yrs	Total population aged 10-14 years
15-19yrs	Total population aged 15-19 years
malepct	Percentage of state that is Male
personal_income	Personal Income Per Capita (in $)
average_wage	Average wage per job (in $)
fmhpi	Measure of typical price inflation for US Homes (year-end amount)
educ_expend	Total Education Expenditure in state (CPI-adjusted in terms of 2008 USD)
educ_expend/pupil	Education Expenditure/Public School Student in state (CPI-adjusted in terms of 2008 USD)
cpi_08	Consumer Price Index relative to 2008 (with 2008 having an index of 1)
or_measure_5	Dummy variable equal to 1 in years after OR Measure 5 was passed (1991 onwards)
proposition_13	Dummy variable equal to 1 in years after Proposition 13 was passed (1979 onwards)
az_equalization	Dummy variable equal to 1 in years after the Arizona Equalization Formula was utilized (1981 onwards)
10-90%educ_cnty	Difference between the 10th and 90th percentile counties' education expenditures (CPI-adjusted in terms of 2008 USD)
25-75%educ_cnty	Difference between the 25th and 75th percentile counties' education expenditures (CPI-adjusted in terms of 2008 USD)

Table 2: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
state_code	117	2	0.8200	1	3
ca	117	0.3333	0.4734	0	1
az	117	0.3333	0.4734	0	1
or	117	0.3333	0.4734	0	1
year	117	1989	11.3030	1970	2008
population	117	11700000	12300000	1799531	36600000
private_enroll	71	281041.6	255733.1	23100	648564
public_enroll	117	2086372	2173967	439524	6322141
private/public	71	0.0851	0.0242	0.0484	0.1321
am_ind	117	114567.8	158186.6	0	513331
am_ind_pct	117	0.0132	0.0194	0	0.0587
asian	117	690650.2	1495291	0	4984565
asian_pct	117	0.0286	0.0428	0	0.1363
black	117	771783	992897.1	26464	2613181
black_pct	117	0.0416	0.0249	0.0126	0.0779
other	117	382801.6	845418.9	0	5682241
other_pct	117	0.0307	0.0368	0	0.1899
multiracial	117	15888.18	149350.1	0	1607646
multiracial_pct	117	0.0009	0.0058	0	0.0475
white	117	9761416	9756550	1636463	28500000
white_pct	117	0.8856	0.0618	0.5955	0.9727
5-9yrs	117	880912.2	929123.5	180670	2725880
10-14yrs	117	883220.9	915885.1	180124	2745820
15-19yrs	117	895179.8	921387.3	174752	2699435
malepct	117	0.4951	0.0032	0.4898	0.5014
personal_income	117	18690.66	10469.4	3829	43852
average_wage	117	23340.33	11728.02	6679	52500
fmhpi	102	81.3669	46.0702	18.38	216.81
educ_expend	60	13800000000	15500000000	2310000000	66400000000
educ_expend/pupil	60	7183.8670	1254.0110	4770.603	10583.2
cpi_08	117	0.5706	0.2456	0.1802111	1
or_measure_5	117	0.1538	0.3624	0	1
proposition_13	117	0.2564	0.4385	0	1
az_equalization	117	0.1709	0.3781	0	1
10-90%educ_cnty	21	883000000	695000000	222000000	3100000000
25-75%educ_cnty	21	241000000	245000000	51000000	918000000

Table 3: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1) private/public	-																						
2) year	-0.543	-																					
3) ca	0.807	-0.250	-																				
4) or	-0.166	0.158	-0.633	-																			
5) az	-0.855	0.158	-0.633	-0.200	-																		
6) az_equalization	-0.855	0.158	-0.633	-0.200	1.000	-																	
7) proposition_13	0.807	-0.250	1.000	-0.633	-0.633	-0.633	-																
8) or_measure_5	-0.166	0.158	-0.633	1.000	-0.200	-0.200	-0.633	-															
9) population	0.725	-0.095	0.987	-0.647	-0.602	-0.602	0.987	-0.647	-														
10) 5-9yrs	0.704	-0.045	0.975	-0.644	-0.589	-0.589	0.975	-0.644	0.995	-													
11) 10-14yrs	0.656	0.028	0.959	-0.629	-0.584	-0.584	0.959	-0.629	0.992	0.991	-												
12) 15-19yrs	0.736	-0.105	0.986	-0.645	-0.602	-0.602	0.986	-0.645	0.996	0.988	0.987	-											
13) am_ind_pct	-0.952	0.380	-0.699	-0.082	0.966	0.966	-0.699	-0.082	-0.635	-0.612	-0.589	-0.645	-										
14) asian_pct	0.214	0.535	0.571	-0.315	-0.408	-0.408	0.571	-0.315	0.678	0.720	0.742	0.631	-0.258	-									
15) black_pct	0.709	-0.291	0.975	-0.783	-0.451	-0.451	0.975	-0.783	0.961	0.950	0.928	0.959	-0.546	0.519	-								
16) white_pct	-0.565	0.025	-0.940	0.796	0.393	0.393	-0.940	0.796	-0.970	-0.973	-0.970	-0.963	0.433	-0.688	-0.963	-							
17) malepct	0.737	-0.274	0.974	-0.693	-0.539	-0.539	0.974	-0.693	0.962	0.956	0.930	0.943	-0.603	0.614	0.977	-0.942	-						
18) fmhpi	-0.391	0.852	-0.080	0.107	-0.006	-0.006	-0.080	0.107	0.060	0.061	0.182	0.062	0.195	0.484	-0.141	-0.085	-0.139	-					
19) educ_expend	0.566	0.162	0.902	-0.578	-0.563	-0.563	0.902	-0.578	0.955	0.950	0.983	0.954	-0.538	0.764	0.860	-0.934	0.855	0.353	-				
20) 10-90%educ_cnty	0.328	0.374	0.771	-0.601	-0.375	-0.375	0.771	-0.601	0.859	0.862	0.915	0.857	-0.314	0.810	0.752	-0.887	0.736	0.534	0.964	-			
21) 25-75%educ_cnty	0.552	0.165	0.897	-0.588	-0.547	-0.547	0.897	-0.588	0.951	0.945	0.980	0.951	-0.524	0.759	0.859	-0.935	0.851	0.362	1.000	0.968	-		
22) educ_expend/pupil	-0.049	0.612	-0.065	0.508	-0.426	-0.426	-0.065	0.508	0.020	0.004	0.112	0.031	-0.233	0.327	-0.229	0.094	-0.182	0.827	0.264	0.325	0.265	-	
23) personal_income	-0.122	0.883	0.189	0.001	-0.240	-0.240	0.189	0.001	0.333	0.366	0.446	0.331	-0.038	0.746	0.101	-0.342	0.119	0.877	0.573	0.708	0.573	0.732	-

Table 4: Empirical Models

	Dependent Variable				
Variable	**private/public**	**educ_expend**	**educ_expend/pupil**	**10-90%educ_cnty**	**25-75%educ_cnty**
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
year	0.0152	1.27E+09	463.3094	2618695	-2543302
	9.02 ***	*2.74* ***	*2.20* **	*0.18*	*-0.83*
ca	1.0102	-2.29E+10	4644.1570	-4.38E+09	-856000000
	14.89 ***	*-1.13*	*0.56*	*-1.74*	*-1.56*
or	-0.2070	2.58E+08	2133.9160	219000000	89200000
	-10.09 ***	*0.03*	*0.55*	*0.34*	*0.67*
az	(dropped)				
az_equalization	-0.0332	-2.91E+08	259.1556	-44500000	-7953011
	-4.98 ***	*-0.49*	*0.73*	*-0.40*	*-0.36*
proposition_13	0.0347	-6.88E+09	-1457.4830	-8.75E+08	-334000000
	6.91 ***	*-3.45* ***	*-2.43* **	*-6.68* ***	*-11.10* ***
or_measure_5	-0.0192	-8.31E+08	-372.2802	-17400000	3981505
	-5.57 ***	*-1.41*	*-1.50*	*-0.24*	*0.31*
population	0.0000	2536.50	0.0002	271.8261	85.44316
	-5.92 ***	*3.23* ***	*0.48*	*4.94* ***	*7.37* ***
5-9yrs	0.0000	-13187.79	-0.0031	-1993.774	-525.7014
	-3.61 ***	*-1.65*	*-1.20*	*-5.63* ***	*-7.44* ***
10-14yrs	0.0000		-0.0027	634.5229	
	2.43 **		*-2.23* **	*3.74* **	
15-19yrs		25644.83	0.0046	766.3604	237.2343
		4.98 ***	*1.82* *	*2.55* *	*3.05* **
am_ind_pct	0.0541	-2.08E+10	-13791.6300		
	0.97	*-2.06* **	*-1.53*		
asian_pct	0.0814	3.18E+10	8717.8430		
	2.26 *	*3.81* ***	*2.14* **		
black_pct	-11.0748	-6.42E+11	-134997.4000	-1.38E+10	-4960000000
	-12.63 ***	*-2.96* ***	*-1.51*	*-0.49*	*-0.85*
white_pct	1.1317	-1.08E+11	-37822.7000	-13300000000	-2980000000
	4.79 ***	*-0.95*	*-0.70*	*-2.33* *	*-2.79* **
malepct	10.4568				
	5.84 ***				
fmhpi	0.0005	9.98E+07		-5144712	-557222.5
	2.79 **	*2.33* **		*-1.51*	*-0.83*
educ_expend/pupil	0.0000				
	-6.53 ***				
personal_income	0.0000	-1798458	-0.4734		
	-4.92 ***	*-2.84* ***	*-1.76* *		
Constant	-35.6950	-2.39E+12	-870379.5000	7.39E+09	7800000000
	-10.54 ***	*-2.55* **	*-2.01* *	*0.22*	*1.15*
# of Observations	27	57	57	18	18
R-squared	0.9952	0.9975	0.8981	0.9980	0.9992
Adj R-squared	0.9952	0.9966	0.8573	0.9916	0.9972
F-statistic	21.38	1090.32	22.03	154.48	504.34

t-statistics given in italics
*significant at the 10% level
** significant at the 5% level
*** significant at the 1% level

Figure 1: Private to Public Enrollment Ratio, 1970-2008

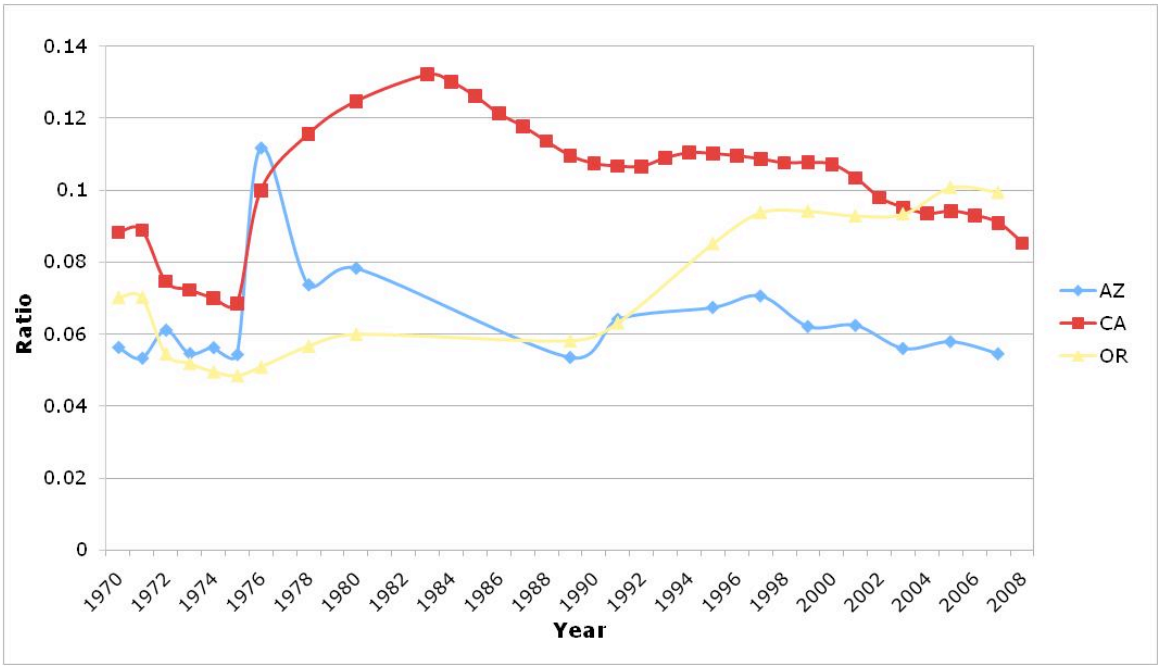

Figure 2: Real Education Expenditure Per Public School Student

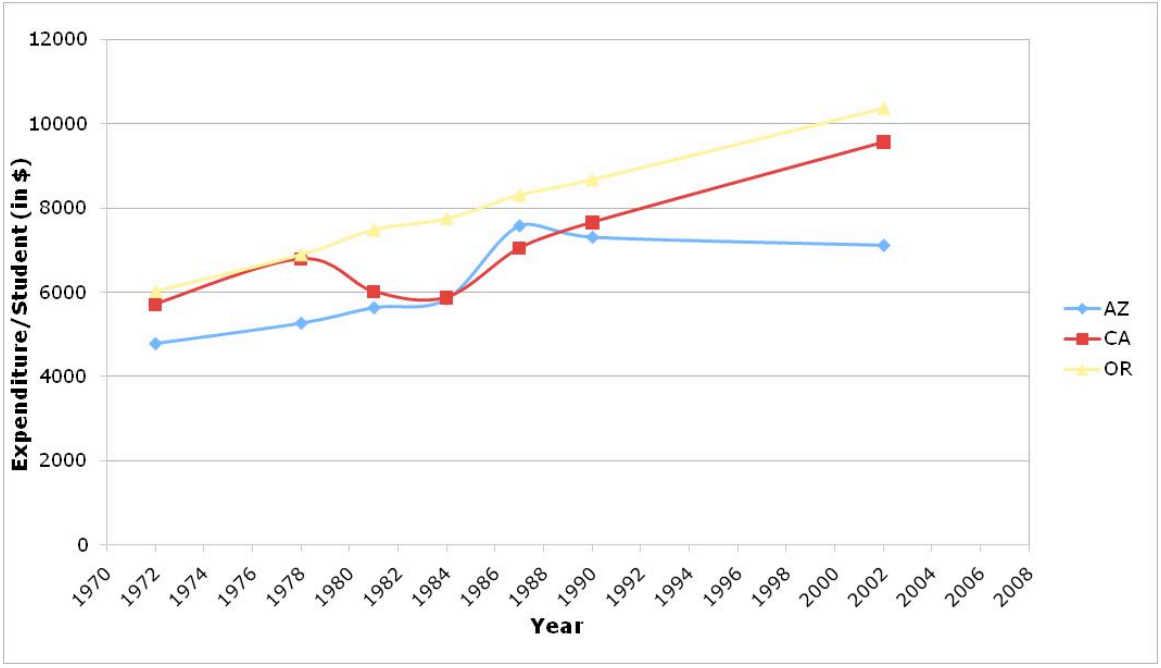

Figure 3: 10-90th Percentile Differences (Total Education Expenditure)

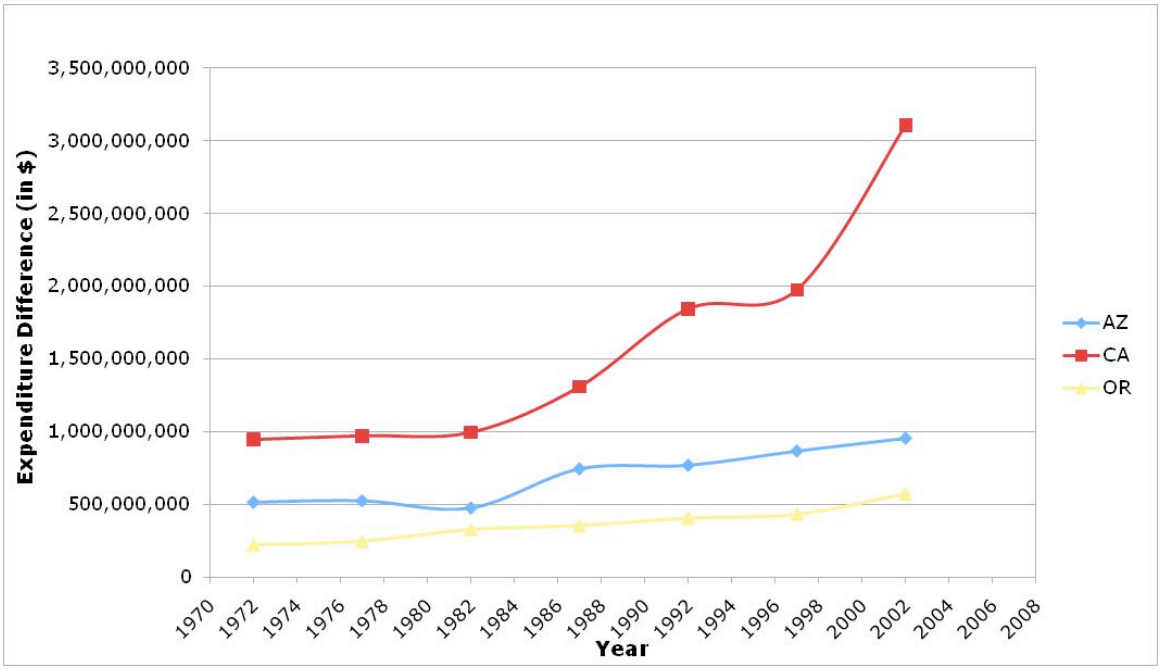

Figure 4: 25-75th Percentile Differences (Total Education Expenditure)