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The Impact of Political Parties on Education Quality

Daniel Sexton, Stonehill College

Education is the cornerstone of growth in any country; certainly this is no exception in the United States of America. It is also fair to say that education is inseparably intertwined with politics in the modern world. With that said, the two major political parties in the United States, Republicans and Democrats, are generally characterized as having opposing impacts on education, in particular state education, through their policies relating to education spending. According to general rhetoric, Democrats are liberal spenders, suggesting they would implement more social programs and spending directed towards education, all positively influencing the quality of education. Republicans on the other hand are polarized as being fiscally conservative, suggesting that they might look to freeze spending on social programs and possibly even propose spending cuts, leading to negative effects on education quality. Since education is an essential facet of American life and prosperity, I hope to identify quantitatively, the impact that each party has on the quality of education in the United States at a state level.

To identify any quantitative difference between the two parties this paper will look at the relationship between the political party of a state, its governor and that state's SAT scores. Although the model will be fully defined later in the paper, the model revolves around two different dummy variables, one for a governor's political party and another for the "state's" political party, with the independent variable being state SAT scores from 2001-2010. With certain key influencing variables held constant this model will allow us to estimate, through the coefficient on the political party dummies, the influence that a given political party has on education quality. This paper works off two large assumptions; the first being that governors elected under either the Democrat or Republican Parties will in general implement relatively similar and consistent policy and spending initiatives consistent with each party's ideals. Second, we assume that SAT scores act as a reasonable proxy for the quality of education in that given state.

Education is a critical topic to inspect in its own right given its value to economic growth; however, it is even more important now given trends that have arisen in the past decade. A decade which began with the signing of the landmark No Child Left Behind Act, a bipartisan program passed "to improve the performance of America's elementary and secondary schools". (*US Department of Education*, 2001). No Child Left Behind gained traction because of a universally accepted view that there was a widening education gap between those who were well off and mobile enough to obtain quality education and the needy that could not pursue that same luxury.

Even though No Child Left Behind looked to close that gap, many studies still suggest that the overall quality of the United States' education system is slipping compared to the rest of the world. Most notably the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA) report ranks the United States' education system as "average", with rankings in reading, science, and mathematics ranging from 14^{th} to 25^{th} among the 34 OECD member nations (*OECD, 2009, PISA Country Profiles*). The significance of these rankings extends beyond prestige and image, but in fact may have a long lasting economic impact. Estimates suggest that "boosting US scores for reading, math and science by 25 points over the next 20 years would result in a gain of 41 trillion dollars for the United States economy over the lifetime of the generation born in 2010" (OECD, 2011, *Lessons from PISA for the United States*).

I. Literature Review

Research for this paper not surprisingly produced a wide range of research looking at standardized test scores, specifically the SAT. However, this research did not provide much depth in regards to the possible impact that political affiliations, at any level, may have on education quality. Instead much of the research shed light on crucial control variables to use when examining state SAT scores. Many researchers have put forth extensive work highlighting statistically significant variables that help identify and explain the variation in SAT scores between states. To bolster the explanatory power of my regression, these identified variables will be included in hopes of removing a significant portion of bias that would otherwise have been picked up in the Political Party dummy variable coefficient.

In 1993, Amy E. Graham and Thomas A. Husted provided a comprehensive analysis of state SAT scores with the hopes of re-ranking states after including key determinants of test performance, entitled *Understanding State Variations in SAT Scores*. The basis for their work came from previous research which identified the apparent inverse relationship between average state SAT scores and state participation rates. Participation rates are important because they quantitatively identify the idea of self-selection in states with low participation rates, where the test-takers are "self-selected as more likely to succeed" (*Graham and Husted, 1991, 198*). In essence Graham and Husted suggest that "Lower average state SAT scores reflect, in part, larger state participation rates that include a greater number of lower performing high school students" (*Graham and Husted, 1991, 198*). However, in their opinion, merely accounting for participation rates left out a wide range of significant influencing factors. Thus, in creating their model for adjusted state SAT scores they included control variables for sex (called FEMALE), race (called BLACK), family income (called MEANINC), and parental education levels (called PARENTED). The sex variable was represented by the percentage of female test-takers, and the race variable was represented by the percentage of black test-takers, while the parental education level variable was obtained through test-takers' registration responses for 1991, the year that Graham and Husted chose to adjust and re-rank. The significance of these variables had already been identified at a state level by Powell and Steelman in 1984, but Graham and Husted rightfully critiqued that using state-wide data for these variables may not always properly capture the make-up of the state test-taker subpopulation. Using test-taker specific data they found that all variables were significant and had the following relationships to SAT scores; Participation Rates: positively related, FEMALE: negatively related, BLACK: negatively related, MEANINC: positively related, PARENTED: positively related (*Graham and Husted, 1991*). Although Graham and Husted obviously created a better regression with more precise variable data, they had access to data which was unattainable for this paper. However, the fact that the coefficient signs their regression produced were still statistically significant and matched the direction of those produced in Powell and Steelman's research leaves me relatively comfortable in using state-wide data to fill my variables.

While Powell and Steelman provide strong evidence in favor of including certain variables in my regression, many theoretical arguments surrounding SAT regressions and the subsequent data selection are addressed by Behrendt, Eisenach, and Johnson (to be referred to as BE&J from here on out) in a paper titled *Selectivity Bias and the Determinants of SAT Scores*. Although the intent behind their paper is the regression they put forth, the true usefulness of their paper for my work comes from their defense of the validity of their model. The similarities between the construction and theory behind the variables in our respective models makes the points raised in their paper applicable to my own work.

The first issue raised and addressed by BE&J is the extent to which factors may influence a student's SAT scores. They generalize to the extreme and assume that "current SAT scores are presumably influenced by factors working over the entire lifetime of those taking the test" (*Behrendt, Eisenach, and Johnson, 1982, 365*). Such an assessment would require that a well formed model include an elaborate and unreasonably lengthy series of data and lagged variables going back 18 years. However, they refute such a requirement by claiming that year by year data is still accurate because "observations on the independent variables are likely to by highly correlated over time" (*Behrendt, Eisenach, and Johnson, 1982, 365*). In essence, beyond the variable for political party, the independent variables included in my regression can be seen as more or less representative and highly correlated with the values of all the years influencing that specific year's SAT scores. I believe that this rationale can also be extended to the dummy variable for a governor's political party, where the political party of a state's governor can be more or less predicted by the political parties preceding it. This thought is only reaffirmed by the 8 "Republican" states and 8 "Democratic" states, which are highly engrained in their voting habits.

The second concern raised by BE&J is the reality that some students taking the SAT as a student in a given state had some of their schooling in a different state. This concern touches on the fact that families move and thus there will be students who have been in multiple schools across more than one state. The trio tested for any possible effect caused by "movers" and hypothesized that "interstate movement of students is random with respect to expenditures, [thus] in high expenditure states the incoming students would tend to have experienced less expensive previous educations so the effect of high expenditures would be diluted by high mobility" (*Behrendt, Eisenach, and Johnson, 1982, 365*). Interstate movement being random with respect to state education expenditures was confirmed when BE&J found that the variable for mobility produced a slightly negative coefficient in their regression which was ultimately not significantly different from zero.

Beyond a theoretical defense of their regression, BE&J also comment on issues pertaining to the inclusion of different variables or altering forms of various variables. First they comment on the impact of using a combined 1600 SAT score versus broken out scores for both the verbal and math portions of the SAT. BE&J opted to run regressions using both scoring options and found that no statistically significant difference was present when comparing the two regression results. After settling this intricacy, BE&J then looked into any possible influence that the varied prominence of the American College Testing program (the ACT) across America may have on state SAT scores. Three hypotheses were used to test any possible impact. The first considered the possibility that all top students take only the ACT. The second regression was run under the idea that there is an equal and random distribution across SAT and ACT takers. The third and final hypothesis was that all top students take only the SAT. In comparing all three regressions, BE&J found that there was no "appreciable difference in the results" *(Behrendt, Eisenach, and Johnson, 1982, 366)*, enforcing that ACT scores and participation rates need not be accounted for or included in the regression.

III. Discussion of Data

To adequately address the proposed hypothesis this regression, as described in the following section, requires a panel dataset which has been set during the past decade, from 2001-2010. Although it may have been beneficial to expand this window of data, it was unfeasible to do so given that all inclusive state-by-state SAT participation rates are not available until 2001. After identifying the time period from which the data would be taken, 24 states were then randomly selected from 3 clusters of state groups, those that voted heavily Democrat in the past four presidential elections, those that were heavily Republican in the past four elections, and those that were roughly split, "swing states". These clusters were created from a New York Times poll compilation from the past four elections, with eight states being randomly selected from each group (The New York Times 2008). This time frame is a representative period to look at given that neither party, Democrat or Republican, received less than 19 states in any of those four elections, providing a broad enough pool from which to create the groupings. These three groupings comprise the dummy variables for a state's political party affiliation, one of the three model specifications.

As previously stated, SAT scores will be used to represent the quality of education in a given state. SAT scores, along with participation rates, were taken from College Board, an organization that looks to "provide resources, tools and services to students, parents, colleges and universities in the areas of college planning", including compiling comprehensive state-by-state SAT data including participation rates. Although compiled state-by-state SAT data is easily accessible back to 1996 through College Board's website, they only started providing SAT participation rate data dating back to 2001 and efforts to find such statistics for the 24 selected states were unsuccessful. College Board calculates participation rates as the percentage of graduating high school seniors who opt to take the SAT in that given year, where the percentage of high school graduates is based upon the most recently revised projection available in the given year of high school graduates by the Western Interstate Commission for Higher Education (WICHE), and the number of students in that class year who took the SAT in each state.

The other variables in the regression, Political Party and Median Income, were taken from government affiliated websites. To identify the political party affiliation of a state's governor over the past ten years each state's respective State Government website was used (ex. Mass.gov). With this data I created a dummy variable to identify the impact of a governor's political party, where 1 equals Democratic and 0 equals Republican. As for the Median Income variable, this data was pulled from the US Census Bureau's American Community Survey. In particular the yearly median income numbers were pulled from the Median Household Income by State – Single Year Estimates Report. Lastly, a state expenditures on education variable was included, with data taken from the U.S. Census Bureau's Elementary-Secondary School Education Finance Data. In particular, the state expenditures variable is comprised of expenditure data at a per pupil level, with the logic that per pupil data provides a better level of comparison across varying states with varying populations.

Currently, the most glaring short coming in the model discussed below is the lack of a variable accounting for the presence of private schools in a state. Although this variable would be beneficial in helping to describe state SAT scores, there is no complete or reliable time series data on private schools across states that I have been able to find. Beneficial data that should be included in future regressions, per the successful results documented in the Literature Review above, include, but are not limited to, the percentage of blacks and females in a given state, with the assumption that this information could be obtained at a student body level.

IV. Empirical Model

With the variable data compiled it is now time to create and run a regression which will produce a quantitative look at the impact a governor's political party may have on the quality of a state's education. The following are those regression specifications:

(1) Specification 1:

$$SAT = \beta_0 + \beta_1 DGOVPP + \beta_2 PR + \beta_3 MEDINC + \beta_4 EDEXP + \varepsilon$$

(2) Specification 2:

$$SAT = \beta_0 + \beta_1 DummyDem + \beta_2 DummyRep + \beta_3 PR + \beta_4 MEDINC + \beta_5 EDEXP + \varepsilon$$

(DummySwing Omitted)

(3) Specification 3:

$$SAT = \beta_0 + \beta_1 DummyDD + \beta_2 DummyRD + \beta_3 DummyDR + \beta_4 DummyRR + \beta_5 DummyDS + \beta_6 PR + \beta_7 MEDINC + \beta_8 EDEXP + \varepsilon$$

(DummyRS Omitted)

Where: SAT = State SAT scores
DGovPP = dummy where 1 = Democratic Governor Political Party affiliation
DummyDem = dummy where 1 = Democratic State Political Party affiliation
DummyRep = dummy where 1 = Republican State Political Party affiliation
DummySwing = dummy where 1 = Swing State Political Party affiliation
DummyDD = dummy where 1 = Democratic Governor in a Democratic State
DummyRD = dummy where 1 = Republican Governor in a Democratic State
DummyDR = dummy where 1 = Democratic Governor in a Republican State
DummyRR = dummy where 1 = Republican Governor in a Republican State
DummyDS = dummy where 1 = Democratic Governor in a Swing State
DummyRS = dummy where 1 = Republican Governor in a Swing State
PR = State SAT participation rates
MEDINC = Sate median income
EDEXP = State Education Expenditures

The following paragraphs will explain the above variables, the rationale behind including them, and the possible signs we may expect to find on their produced coefficients.

The first variable is the dummy variable for the state governor's political party affiliation, where years spent under a Democrat receive a 1 and years under a Republican receive a 0. This variable is obviously a key dependent variable which should, with other relevant and significant influencing variables included in the regression as controls, identify in a comparative manner the influence that a Democratic governor has on SAT scores in a state compared to a Republican governor. One concern with this variable was the possibility of needing to lag the variable in order to take in to account the time it takes for policy changes. With no credible studies done to provide an accurate estimate of what the lag length should be a wide variety of lags we tried. Ultimately, no one lag proved to have any statistical significance over another and with no research to suggest a particular lag length, the variable was included with no lag. In general we would expect this variable to produce a positive coefficient, as general rhetoric suggests that increases in state education spending, a staple of the Democratic party, would lead to greater increases in the quality of state education and thus SAT scores under a Democrat compared to a Republican. Even if this assumption holds true, the ultimate test will be whether or not the variable is statistically significant among the other included variables. If this variable turns out to be statistically insignificant it may suggest that exogenous socioeconomic and regionally influenced variables like participation rates and median incomes play a larger role in SAT score results than the political party represented in state government.

In place of this variable I will also use a pair of state political party dummies which identify the impact of a state's political affiliation as determined by voting trends over the past 4 presidential elections. The two dummies included identify Democratic States (DummyDem = 1) and Republican Sates (DummyRep = 1) with Swing states being captured in the regression constant. The coefficient on these variables will shed light on the impact of political rhetoric and pressures within a given state beyond a governor's political party affiliation, as well as the impact of the overall trend in voting and political actions beyond just year to year fluctuations. In essence these variables provide somewhat of a smoothing effect to the year to year data used in the governor's political party variable and hopefully will better pick up the trends behind the influence that certain political parties have on the quality of education.

The last key independent variables used in my regressions are five dummy variables, where each dummy variable captures a different governor-state political party affiliation combination. The five combinations included in the regression, where the first component indicates a governor's affiliation, while the second component denotes state affiliation, are Democratic-Democratic (DummyDD), Republican-Democratic (DummyRD), Democratic-Republican (DummyDR), Republican-Republican (DummyRR), and Democratic-Swing (DummyDS), with the last combination, Republican-Swing (DummyRS) being captured in the regression's constant term. The usefulness of the coefficients produced on these key independent variables stems from their ability to provide the impact that various governor and state political party affiliation combinations have on a state's quality of education. In essence these variables provide a synthesized statistical analysis of how the key independent variables used in the first two regressions impact education quality together. They allow us the ability to not only see the impact of a governor's political party affiliation but also how the affiliation is influenced by the political culture of the state they were elected in.

The first control variable included in the regression is Participation Rates. The significance of this variable has already been explained and proven under the work of Graham and Husted, as explained during the Literature Review. With that work in mind, I'll merely reiterate that including this variable captures the fact that there is a strong inverse relationship between SAT scores and participation rates which stems from regional pressures which place different levels of emphasis on the importance and necessity of taking the SATs and attending higher education. These differences skew average state SAT scores and inaccurately represent the quality of education in that state. Participation rates help us adjust for this bias.

The next control variable input into the regression is median state income. This variable is important because it captures a few different factors which could lead to higher SAT test scores which must be controlled for. One reason for there being a positive relationship between median income and SAT scores is that families with greater levels of income can afford to obtain higher quality of education for their children. Obtaining higher quality education could include moving to better a school district, sending a child to private school, hiring a tutor, or paying for an SAT prep course. All of those methods just stated for increasing the quality of education a student receives are more likely to be available for families with higher incomes and thus higher levels of discretionary spending. A state's median income also indirectly sheds light on the level of tax revenue that state's government has access to and thus could spend on education. Although tax revenues will fluctuate based on tax rates which differ from state to state, the median income variable should still capture some of the impact that median income has on a state's tax revenue and thus its ability to spend on providing higher education. Lastly, median income will capture some of the impact that parental educational attainment has on a child's SAT scores. This is possible because there is a positive relationship between the level of education attained by a student's parents and that student's performance on the SATs. There is also a positive relationship between the level of education attained and the level of income an individual can expect to make. Thus we can assert that the median income variable will capture some of the impact that parental educational attainment has on SAT scores by suggesting that high median state incomes are at least partially caused by individuals with high levels of education. With all that being said, and keeping the results of Graham and Husted in mind, it is clear that we will expect the median income variable in this regression to produce not only a positive coefficient but one that is statistically significant. In order to produce an easily readable and interpretable variable, median income was input in thousands of dollars.

The final control variable included in the data is state education expenditures per pupil. Including state education expenditures is important because it acts as a proxy for the investment put into the schools in a given state. This school expenditure data is all inclusive and thus includes expenditures related to teachers' wages, capital expenditures, and school related support programs. With increased school expenditures it is reasonable to believe that schools are spending more on teachers and thus able to entice better teachers into their schools. Also, with increased expenditures on schools comes more spending on capital investments towards classroom technology and afterschool support programs, all of which have a positive influence on a students learning experience. In order to provide a greater level of comparability I chose data calculated at a per pupil level. Per pupil data corrects data taken at a gross level by allowing for comparability between states with drastic differences in population, such as California and Vermont. Also, the data was input in thousands of dollars to produce a more readable coefficient when regression results are produced. Three possible short comings with this data relate to costs of living, possible economies of scale, and the question of if all expenditures are made equally. In regards to cost of living, if drastic gaps in costs of living exist between states then some of the difference in state education expenditures will merely be a function of compensating for cost of living expenses and not expenditures spent furthering the quality of education in that state. The second issue relates to the possibility of economies of scale in education spending. It's possible that larger states with larger scale education infrastructure may in fact need to spend less per student to obtain the same level of education as schools of small scales because of benefits obtained from an economy of scale. Essentially two states, one large and one small, with equal levels of education expenditures, may actually have to different levels of education quality because the larger state benefits from economies of scale, thus obtaining greater education quality with equal education expenditures per student. Thus larger states may actually have a greater quality of education than one would expect for their given spending per pupil. However since larger states tend to have a greater costs of living it appears that these two opposing biases in the data might possibly counteract one another. With approximately equal counteracting biases on the expenditures per pupil data we can be fairly comfortable that this variable will produce a reliable coefficient in the regression.

The final shortcoming relating to Education Expenditures relates to whether or not all expenditures impact quality of education the same. It is possible that certain expenditures are more beneficial in impacting the quality of a state's education than are other expenditures. For example, it seems reasonable that expenditures relating to teacher salaries and after school aid programs may have a greater positive influence on a student's ability to learn than expenditures associated with capital improvements. However, given the limited scope of this paper, it appears that this limitation must be left as is, as there are no definitive studies readily available on the comparative impact of specific education expenditures.

In the following section regression results for the above variables will be analyzed. In order to obtain a broad base of information to interpret, three separate regressions will be run in various forms, each centered on a different independent variable looking to identify the impact a given political party has on education quality. The first version includes the variable identifying the specific political party of a state's governor in a given year (GovPP), using a 0, 1 dummy, where 1 equals Democrat and 0 equals Republican. The second specification centers on two independent dummy variables identifying a State's Political Party, where DummyDem = 1 and DummyRep = 1, representing Democratic and Republican states respectively. The third specification uses dummy variables for all possible state/governor political party combinations. These variables will capture the impact that the interplay between a state political environment and its governor's political party has on the quality of education in that state.

V. Empirical Analysis: Specification 1

The first regression was run around the first key independent variable, governor's political party, along with the control variables participation rates and median income. Education expenditures were excluded from this initial regression with the rationale that expenditures may be too closely correlated to all three variables currently included. According to the correlation table results included in the Appendix, education expenditures are correlated to a governor's political party, participation rates, and median income, at approximately 15%, 60%, and 30% respectively. The results from this regression are summarized in Table 1, full and expanded regression results are included in the Appendix.

Table 1: Governor's Political Party Regression (Education Expenditures Excluded)
$SAT = \beta_0 + \beta_1 DGOVPP + \beta_2 PR + \beta_3 MEDINC + \varepsilon$
(R^2 = .7139, $R^2_{Adjusted}$ = .7103)

Variable Name	**Coefficient**	**t - value**
Constant (β_0)	1028.3	56.48
Governor's Political Party (β_1GovPP)	13.4	2.89
Participation Rates (β_2PR)	-220.2	-22.9
Median Income (β_3MedInc)	2.3	6.03

This regression, with the three included variables stated above, describes 71% of the movement in the dependent variable, SAT scores. More importantly, all three independent variables are statistically, at the 95% confidence level, in determining a state's SAT score, with all three t-values greater than 2. For the rest of the paper, statistical significance will be analyzed at the 95% confidence level. We expected statistical significance on the part of participation rates and median income given the results discussed in Literature Review. However, the interesting component of this regression is the statistical significance of the Governor's Political Party variable. The coefficient on this variable suggests that a Democratic governor, (GovPP=1), and thus the policies and actions taken by that governor, account for a 13 point increase in the SAT scores of that state, compared to a Republican governor with all else held constant.

The second regression followed the same specification above but included the variable for state education expenditures. The results of this regression are summarized in Table 2.

Table 2: Governor's Political Party Regression (Education Expenditures Included)

$SAT = \beta_0 + \beta_1 DGOVPP + \beta_2 PR + \beta_3 MEDINC + \beta_4 EDEXP + \varepsilon$
(R^2 = .7430, $R^2_{Adjusted}$ = .7375)

Variable Name	Coefficient	t - value
Constant (β_0)	986.8	46.65
Governor's Political Party (β_1GovPP)	6.83	1.33
Participation Rates (β_2PR)	-252.48	-20.65
Median Income (β_3MedInc)	2.19	5.39
Education Expense (β_4EdExp)	7.34	5.39

In this second regression the addition of the Education Expenditures variable only adds roughly 2% of explanatory power to the equation, with the adjusted R^2 inching up to 73.75%. Again, the t-value results show that both Median Income and Participation Rates are statistically significant variables, along with the newly included Education Expenditures variable. In this regression the coefficient on Education Expenditures suggests that for every thousand dollar increase in education expenditures per student we can expect to see a roughly 7 point increase in that states SAT scores. However, the inclusion of the Education Expenditures drops the t-value of the Governor's Political Party variable down to only 1.33, no longer making it statistically significant. One possible explanation for this reduction in statistical significance may come from that governor's spending initiatives. From a theoretical perspective this makes sense since education spending is the most direct way a governor can influence quality of education. However, the shortcoming with this explanation becomes apparent when looking at the Correlation Table provided in the Appendix. The Correlation Table reveals that there is only a 14% correlation between a governor's political party and education expenditures. If education expenditures were truly a function of a governor's political party then we would expect to find a higher correlation between the two variables. With that being said, the fact that the GovPP variable is a 0, 1 dummy variable, not a continuous variable, explains some of the limited correlation between the two variables. The subsequent regression using the two dummy variables for Democratic and Republican states show a much greater level of correlation, with the Democratic dummy having a 57% positive correlation, while the Republican dummy had a negative 45% correlation.

VI. Empirical Analysis: Specification 2

The next two regressions use the two State Political Party dummy variables (DummyDem and DummyRep), to identify the impact of Democratic and Republican states, respectively, on state education quality, with the impact of swings states being captured in the regression constant. The dummies were constructed using the New York Times poll state groupings described earlier. As with the previous set of regressions, this set begins without the education expenditures variable. The results from this regression can be found in Table 3. Similar to the very first regression, this set of variables explains roughly 72.8% of the movement in SAT scores between states. This regression also produces fairly comparable coefficients on the variables for Median Income and Participation Rates, both of which are still statistically significant. The interesting aspect of this regression is the results of the two dummy variables. The coefficients on these variables suggest that states that are historically Democratic (DummyDem = 1) lead to a 29.55 point increase in SAT scores over 'Swing' states with all else held constant, while states that are historically Republican (DummyRep = 1) only lead to an 8.78 point increase in SAT scores over Swing states with all else held constant.

Table 3: State's Political Affiliation Regression (Education Expenditures Excluded)

$SAT = \beta_0 + \beta_1 DummyDem + \beta_2 DummyRep + \beta_3 PR + \beta_4 MEDINC + \varepsilon$ (R^2 = .7324, $R^2_{Adjusted}$ = .7279)

Variable Name	Coefficient	t - value
Constant (β_0)	1048.21	58.28
Democratic State (β_1DummyDem)	29.55	5
Republican State (β_2DummyRep)	8.78	1.53
Participation Rates (β_3PR)	-233.81	-22.6
Median Income (β_4MedInc)	1.87	4.93

Of the two dummies only the Democratic dummy is statistically significant, however, given the over 20 point gap between the two, it is fair to say that Democratic states clearly have a larger positive impact on state education quality than Republican states, just as Republican states have a larger positive impact on state education quality than 'Swing' states. These results suggest that it is more beneficial for a state commit to one political party rather than straddle the fence between the two, with the Democratic Party being the more beneficial of the two major parties. This makes sense because Swing States essentially represent an environment of disorganization and volatility. With the Governor's office being occupied by competing parties like a revolving door, it is inevitable that there will be a lack of organization regarding the direction of education funding and it's supporting social programs. Program changes and new initiatives introduced by one party, may not be supported by an opposing party successor and may be repealed or ignored. This type of disjointed seesaw of successions leads to confusion, mixed messages, and a lack of consistency, almost ensuring an ineffective impact on education quality, which is apparent in the regression results above.

Next, the above regression was run with the inclusion of the state education expenditures variable (EdExp). The results of this regression follow a similar trend found in Table 2 but with a new intricacy involved. The results of this fourth regression can be found in Table 4. With the addition of the education expenditures variable we once again see that the explanatory power of the regression, represented by the adjusted R^2 value, only increased by about 2%, up to 74.5%. Similarly, the median income and participation rates variables still remain statistically significance. Unlike the previous specification progression, we see that the state political party variables are still significant. In fact, while the Democratic dummy remained statistically significant, the Republican dummy actually became statistically significant with a t-value of exactly 2. Just like in the first specification, the newly included Education Expense variable is statistically significant as well.

Table 4: State's Political Affiliation Regression (Education Expenditures Included)

$SAT = \beta_0 + \beta_1 DummyDem + \beta_2 DummyRep + \beta_3 PR + \beta_4 MEDINC + \beta_5 EDEXP + \varepsilon$($R^2 = .7515$, $R^2_{Adjusted} = .7448$)

Variable Name	Coefficient	t - value
Constant (β_0)	996.27	43.72
Democratic State (β_1DummyDem)	17.54	2.55
Republican State (β_2DummyRep)	12.49	2
Participation Rates (β_3PR)	-252.69	-20.86
Median Income (β_4MedInc)	1.94	4.71
Education Expense (β_5EdExp)	6.89	4.76

This regression also produces a nearly identical coefficient on the education expenditures variable, where for every thousand dollar increase in education expenditures per student we should expect to see a roughly 7 point increase in the state average SAT scores. Similar to the last regression, both the Democratic and Republican state dummies produced positive coefficients on state education quality compared to 'Swing' states, with Democratic state producing an larger positive impact by 5 points. However, the inclusion of the Education Expense variable led to a reduction of the coefficient on the Democratic State dummy, but led to an increase of the coefficient on the Republican State dummy. This behavior might be explained by the possibility that much of the influence that Democrats wield in regards to education quality materializes in the form of education expenditures, while Republicans tend to avoid spending on education and exert their influence on education quality more through policy and standards. This is reinforced by the Correlation Table in the Appendix, which shows that there is a positive 57.34% level of correlation between the Democratic dummy and education expenditures, while there is a negative 45.54% level of correlation between the Republican dummy and education expenditures.

VII. Empirical Analysis: Specification 3

The third and final specification employs 5 dummy variables which capture the 6 possible combinations of Governor and State political party affiliations. For the sake of this regression and as a result of the data compiled, the six Governor-State political party combinations are as follows: Democratic-Democratic, Republican-Democratic, Democratic-Republican, Republican-Republican, Democratic-Swing, and Republican-Swing. The first five combinations all received their own dummy in the regression, with the Republican-Swing combination being captured by the regression constant. The results of this regression are summarized in Table 5. Consistent with previous two specifications, this first regression explains approximately 74% of the variation of the movement in the SAT scores variable. The results of this regression also show that every variable is statistically significant, most importantly the Governor-State political party combinations. The Governor-State political party combination coefficients reveal a hierarchy of which combinations lead to the greatest positive influence on state education quality. Using the Republican-Swing combination as the base combination for our analysis, with an SAT score of 1036, we can then rank the rest of the combinations by the positive impact they exert on top of that base score. The best two combinations of Governor and State are those occurring in Democratic States, DummyDD and DummyRD, which impose the largest positive increases, 42.61 and 42.12 respectively, on SAT scores over the base score, with all else held constant.

After the two Democratic state combinations, the combination with the greatest positive impact on state SAT scores is a Democratic Governor in a Swing state, which produced a 28.6 point increase over the base score of 1036. Lastly, the two Republican state combinations produced the smallest positive influence on state SAT scores, with a Democratic governor in those states producing a 27 point increase, while a Republican governor only produced a 22.8 point increase with all else held constant. However, before any concrete claims are made based off this regression, it is important that we first run the same regression with the inclusion of the Education Expenditures variable.

Table 5: Governor, State Political Party Affiliation Regression (Education Expenditures Excluded)

$$SAT = \beta_0 + \beta_1 DummyDD + \beta_2 DummyRD + \beta_3 DummyDR + \beta_4 DummyRR + \beta_5 DummyDS + \beta_6 PR + \beta_7 MEDINC + \varepsilon$$

($R^2 = .7475$, $R^2_{Adjusted} = .7399$)

Variable Name	**Coefficient**	**t - value**
Constant (β_0)	1035.93	57.65
Democratic Governor, Democratic State (β_1DummyDD)	42.61	5.68
Republican Governor, Democratic State (β_2DummyRD)	42.12	5.18
Democratic Governor, Republican State (β_3DummyDR)	27	3.1
Republican Governor, Republican State (β_4DummyRR)	22.8	3
Democratic Governor, Swing State (β_5DummyDS)	28.6	3.67
Participation Rates (β_6PR)	-225.06	-21.19
Median Income (β_7MedInc)	1.78	4.74

		Governor's Party	
		Democratic	Republican
Presidential Preference	Democratic	42.61 (5.68)	42.12 (5.18)
	Republican	26.97 (3.10)	22.80 (3.00)
	Swing	28.6 (3.57)	Omitted

The inclusion of the Education Expenditures variable produced some similar results compared to its inclusion in previous regressions. For starters its inclusion only improved the explanatory power of the regression to 74.63%. Like previous regressions it also reduced the coefficients on the political party dummies. The complete results are summarized in Table 6 below.

Table 6: Governor, State Political Party Affiliation Regression (Education Expenditures Included)

$SAT = \beta_0 + \beta_1 DummyDD + \beta_2 DummyRD + \beta_3 DummyDR + \beta_4 DummyRR + \beta_5 DummyDS + \beta_6 PR + \beta_7 MEDINC + \beta_8 EDEXP + \varepsilon$
(R^2 = .7569, $R^2_{Adjusted}$ = .7463)

Variable Name	**Coefficient**	**t - value**
Constant (β_0)	995.96	43.62
Democratic Governor, Democratic State (β_1DummyDD)	28.58	3.18
Republican Governor, Democratic State (β_2DummyRD)	23.4	2.41
Democratic Governor, Republican State (β_3DummyDR)	21.2	2.25
Republican Governor, Republican State (β_4DummyRR)	21.09	2.55
Democratic Governor, Swing State (β_5DummyDS)	17.58	1.95
Participation Rates (β_6PR)	-243.34	-18.72
Median Income (β_7MedInc)	1.86	4.49
Education Expense (β_8EdExp)	6.02	3.96

		Governor's Party	
		Democratic	Republican
Presidential Preference	Democratic	28.58 (3.18)	23.4 (2.41)
	Republican	21.2 (2.25)	21.09 (2.55)
	Swing	17.58 (1.95)	Omitted

One unique result in this regression compared to the previous specifications is that the inclusion of the Education Expenditures variable only eliminated one variable's statistical significance. Besides the Democratic Governor-Swing State dummy (DummyDS), the other four included dummies remained statistically significant. After the inclusion of Education Expenditures, the base SAT score, represented by a Republican governor in a Swing State, was 996. Once again Democratic states produced the largest positive increase in SAT scores, with Democratic governors in those states producing a 28.58 point increase over the base, while Republican governors in Democratic sates produced a 23.4 point increase, with all else held constant. Following the Democratic state combinations were the Republican state combinations, with Democratic governors producing a 21.2 point increase, while Republican governors produced a 21.09 point increase over the base. The lowest impact was caused by the Democratic governor, Swing state combination, which is technically no longer statistically significant with a t-value of 1.95. Interestingly enough in the first regression under this specification the DummyDS combination had the third largest impact on state SAT scores. Seeing that the Democratic state combinations fell roughly 20 and 15 points, respectively, from the first regression, while the Republican state combinations only fell 6 and 2 points, with the larger of the two decreases involving a Democratic governor in both cases, suggests that much of influence exerted by a Democratic state and or governor is in the form of education expenditures.

VIII. Conclusion

General rhetoric and theory often suggests that the Democratic Party is better for our education system because of its willingness to spend on schools as well as on related social programs. The regression results presented in this paper suggest that Democrats and their associated policies do in fact impose a positive influence on education quality at the state level. However, the above regressions show that a state's political environment may exert a greater influence on education quality than a governor's political party. This is first apparent when comparing the first two specifications where the Democratic dummy in the second specification regressions had a much larger positive coefficient than the one present on the first specification regressions. This was then confirmed by the third specification where there were much larger differences in the size of the coefficients between the same governor political parties in states with different political affiliations (i.e. Dummy DD v Dummy DR) than there were between governors with different political parties in states with the same political party (i.e. Dummy DD v. Dummy RD). Quantitatively, the Dummy DD coefficient of 28.58 points from the last regression would move the 2010 average score of a 1017 from the 50th percentile up to a 1035, putting it into the 55th percentile. That represents a modest but important ten percent increase in percentile on the average SAT score. However, it is important to remember where the true impact on education quality by the Democratic Party lies. According to the regressions a large part of the impact that the Democratic Party has on state education quality stems from education expenditures at the state level. All three regression specifications revealed that when the education expenditures per pupil variables were included they were statistically significant, while the political party coefficients were significantly reduced, in some cases up to 50%. This reaction tells us that while Democratic social programs, and the culture they cultivate, may have a positive influence on education in a state; the biggest impact the Democratic Party has stems from expenditures directed specifically at schools.

An important qualification to the impact of the Democratic Party arose when examining the first two specifications, while specifically focusing on the final regression. The three specifications revealed that the overall political affiliation of a state has a greater influence on the quality of education in state than does just the governor's political affiliation. This was most clearly revealed through the third specification which "ranked" the two Democratic state combinations above the two Republican state combinations in regards to their impact on education quality at the state level. In fact, within each of those two combination pairings the combination with the Democratic governor always had the greater positive impact on state SAT scores; this was true for the Swing state combinations as well. Again, in all three cases though, it was apparent that the true impact of the Democratic Party comes from their ability to increase education expenditures in a state.

Now as nice as it would be to be able to definitively claim that Democrats are better for education or that in order to improve our education system states needed to begin to vote Democrat, the truth is that that would be an unfair characterization of the regression results. Too many other geographic factors such as educational tradition and history, relevant job industries and pressures, and many more, impact the quality of education in any given state to make such a univocal statement. However, it is not unreasonable to suggest that in order for the United States as a whole to improve the education system there must be a continued investment, at the state level, of funds committed specifically for education spending. What the regressions truly tell us is that this commitment to spending on education is most consistently upheld and implemented in Democratic states and by Democratic governors. Hopefully, such a commitment may serve as one important step towards closing the growing educational gap with in the United States, as well as between the United States and other developed nations.

IX. Appendix

State Political Party Affiliation Groupings:

Democrat	Republican	'Swing States'
- California	- Arizona	- Florida
- Illinois	- Idaho	- Iowa
- Maryland	- Indiana	- Kentucky
- Massachusetts	- Mississippi	- Nevada
- New Mexico	- Nebraska	- Ohio
- New York	- Oklahoma	- Texas
- Oregon	- South Dakota	- Virginia
- Vermont	- Utah	- West Virginia

Summary Statistics – Specification 1:

Variable	Obs	Mean	Std. Dev.	Min	Max
GovPP	240	.4583333	.4993022	0	1
SAT	240	1072.867	66.29236	983	1225
PR	240	.3553333	.2778487	.03	.92
MedInc	240	50.71878	6.974139	35.58195	69.01388
EdExp	192	8.570537	2.294828	4.86	18.12602

Summary Statistics – Specification 2:

Variable	Obs	Mean	Std. Dev.	Min	Max
DummyDem	240	.3333333	.4723897	0	1
DummyRep	240	.3333333	.4723897	0	1
SAT	240	1072.867	66.29236	983	1225
PR	240	.3553333	.2778487	.03	.92
MedInc	240	50.71878	6.974139	35.58195	69.01388
EdExp	192	8.570537	2.294828	4.86	18.12602

Summary Statistics – Specification 3:

Variable	Obs	Mean	Std. Dev.	Min	Max
DummyDD	240	.1833333	.3877482	0	1
DummyRD	240	.15	.3578177	0	1
DummyDR	240	.1125	.316641	0	1
DummyRR	240	.2208333	.4156753	0	1
DummyDS	240	.1625	.3696798	0	1
DummyRS	240	.1708333	.3771498	0	1
SAT	240	1072.867	66.29236	983	1225
PR	240	.3553333	.2778487	.03	.92
MedInc	240	50.71878	6.974139	35.58195	69.01388
EdExp	192	8.570537	2.294828	4.86	18.12602

Correlation Table – Specification 1:

	GovPP	SAT	PR	MedInc	EdExp
GovPP	1.0000				
SAT	0.1963	1.0000			
PR	-0.1111	-0.8070	1.0000		
MedInc	-0.0403	-0.2229	0.4944	1.0000	
EdExp	0.1421	-0.2902	0.5827	0.2940	1.0000

Correlation Table – Specification 2:

	DummyDem	DummyRep	SAT	PR	MedInc	EdExp
DummyDem	1.0000					
DummyRep	-0.5000	1.0000				
SAT	-0.1958	0.3595	1.0000			
PR	0.4643	-0.4595	-0.8070	1.0000		
MedInc	0.3959	-0.2321	-0.2229	0.4944	1.0000	
EdExp	0.5734	-0.4554	-0.2902	0.5827	0.2940	1.0000

Correlation Table – Specification 3:

	DummyDD	DummyRD	DummyDR	DummyRR	DummyDS	DummyRS	SAT	PR	MedInc	EdExp
DummyDD	1.0000									
DummyRD	-0.1996	1.0000								
DummyDR	-0.1669	-0.1548	1.0000							
DummyRR	-0.2455	-0.2277	-0.1904	1.0000						
DummyDS	-0.1957	-0.1815	-0.1517	-0.2232	1.0000					
DummyRS	-0.2190	-0.2032	-0.1699	-0.2498	-0.1992	1.0000				
SAT	0.0147	-0.2696	0.1444	0.2987	0.1283	-0.3189	1.0000			
PR	0.1481	0.4471	-0.1937	-0.3748	-0.1397	0.1237	-0.8070	1.0000		
MedInc	0.1760	0.3289	-0.1576	-0.1432	-0.1033	-0.1042	-0.2229	0.4944	1.0000	
EdExp	0.2901	0.4394	-0.1842	-0.3774	0.0517	-0.1920	-0.2902	0.5827	0.2940	1.0000

Regression 1:

Source	SS	df	MS
Model	749831.51	3	249943.837
Residual	300496.223	236	1273.28908
Total	1050327.73	239	4394.67671

Number of obs =	240
F(3, 236) =	196.30
Prob > F =	0.0000
R-squared =	0.7139
Adj R-squared =	0.7103
Root MSE =	35.683

SATscores	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GovPP	13.42628	4.644458	2.89	0.004	4.276389	22.57617
MedInc	2.300593	.3817305	6.03	0.000	1.548558	3.052627
PR	-220.2098	9.617362	-22.90	0.000	-239.1567	-201.263
_cons	1028.278	18.20518	56.48	0.000	992.4122	1064.143

Regression 2:

Source	SS	df	MS
Model	622451.211	4	155612.803
Residual	215332.705	187	1151.51179
Total	837783.917	191	4386.30323

Number of obs =	192
F(4, 187) =	135.14
Prob > F =	0.0000
R-squared =	0.7430
Adj R-squared =	0.7375
Root MSE =	33.934

SATscores	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GovPP	6.82601	5.132891	1.33	0.185	-3.299803	16.95182
MedInc	2.185051	.4052516	5.39	0.000	1.385598	2.984503
PR	-252.4771	12.22915	-20.65	0.000	-276.6019	-228.3523
EdExp	7.342537	1.362021	5.39	0.000	4.655636	10.02944
_cons	986.8073	21.15395	46.65	0.000	945.0763	1028.538

Regression 3:

Source	SS	df	MS
Model	769284.615	4	192321.154
Residual	281043.119	235	1195.92816
Total	1050327.73	239	4394.67671

Number of obs =	240
F(4, 235) =	160.81
Prob > F =	0.0000
R-squared =	0.7324
Adj R-squared =	0.7279
Root MSE =	34.582

SAT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DummyDem	29.55015	5.905072	5.00	0.000	17.91651	41.18379
DummyRep	8.78116	5.738348	1.53	0.127	-2.524017	20.08634
MedInc	1.872343	.3799464	4.93	0.000	1.123807	2.620879
PR	-233.8123	10.34602	-22.60	0.000	-254.1951	-213.4295
_cons	1048.208	17.98541	58.28	0.000	1012.775	1083.641

Regression 4:

Source	SS	df	MS
Model	629582.741	5	125916.548
Residual	208201.176	186	1119.36116
Total	837783.917	191	4386.30323

Number of obs	=	192
F(5, 186)	=	112.49
Prob > F	=	0.0000
R-squared	=	0.7515
Adj R-squared	=	0.7448
Root MSE	=	33.457

SAT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DummyDem	17.54092	6.870491	2.55	0.011	3.986814	31.09503
DummyRep	12.49073	6.257422	2.00	0.047	.1460854	24.83537
MedInc	1.939336	.4119241	4.71	0.000	1.126692	2.751979
PR	-252.6869	12.11127	-20.86	0.000	-276.58	-228.7938
EdExp	6.88737	1.447523	4.76	0.000	4.031695	9.743044
_cons	996.2742	22.78788	43.72	0.000	951.3183	1041.23

Regression 5:

Source	SS	df	MS
Model	785088.271	7	112155.467
Residual	265239.463	232	1143.27355
Total	1050327.73	239	4394.67671

Number of obs	=	240
F(7, 232)	=	98.10
Prob > F	=	0.0000
R-squared	=	0.7475
Adj R-squared	=	0.7399
Root MSE	=	33.812

SAT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DummyDD	42.61417	7.497429	5.68	0.000	27.84242	57.38592
DummyRD	42.12392	8.136075	5.18	0.000	26.09388	58.15395
DummyDR	26.96763	8.707683	3.10	0.002	9.811392	44.12388
DummyRR	22.79513	7.608782	3.00	0.003	7.803985	37.78627
DummyDS	28.60254	7.793367	3.67	0.000	13.24772	43.95736
MedInc	1.775672	.3747621	4.74	0.000	1.0373	2.514044
PR	-225.0571	10.62328	-21.19	0.000	-245.9875	-204.1267
_cons	1035.93	17.96992	57.65	0.000	1000.525	1071.335

Regression 6:

Source	SS	df	MS		
				Number of obs =	192
				F(8, 183) =	71.22
Model	634118.878	8	79264.8597	Prob > F =	0.0000
Residual	203665.039	183	1112.92371	R-squared =	0.7569
				Adj R-squared =	0.7463
Total	837783.917	191	4386.30323	Root MSE =	33.361

SAT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DummyDD	28.58427	8.995151	3.18	0.002	10.83673	46.33181
DummyRD	23.40023	9.709101	2.41	0.017	4.24406	42.5564
DummyDR	21.19851	9.433924	2.25	0.026	2.585264	39.81175
DummyRR	21.08958	8.25438	2.55	0.011	4.803593	37.37557
DummyDS	17.57541	9.026117	1.95	0.053	-.2332284	35.38404
MedInc	1.860598	.4144704	4.49	0.000	1.042843	2.678353
PR	-243.3388	12.99579	-18.72	0.000	-268.9796	-217.6979
EdExp	6.020001	1.520451	3.96	0.000	3.020133	9.019868
_cons	995.9561	22.83463	43.62	0.000	950.9031	1041.009

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