Varying Levels of State Expenditures for AIDS Drug Assistance Programs: A Cross-sectional Analysis

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> *"But unfortunately, the number of people living with AIDS who can't afford expensive medical treatment is growing, which means that greater demands are being placed on community-based organizations and state and local governments that serve them. The advances in the development of life-saving HIV/AIDS drugs has come with an enormous price tag and these advances have been costly. An estimated 30 percent of persons living with AIDS do not have health care coverage to pay for costly treatments." – Senator Edward M. Kennedy[1]*

The reauthorization of the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act in 2000 extended the AIDS Drug Assistance Program, commonly referred to as ADAP. ADAP allows for poor Americans with AIDS to receive specific drugs helpful to survival. The program is defined as a "payer of last resort," which means clients in need of assistance must have exhausted all other financial methods of payment. According to the Kaiser Family Foundation, ADAP services 136,000 individuals – a number amounting to nearly 30 percent of the people infecting with HIV/AIDS (Kaiser Family Foundation 2004).

The Ryan White (CARE) Act is a discretionary program and therefore its funding levels are subject to annual approvals by the President and Congress. Additionally, because the program is discretionary, or not entitlement based, the levels of funding from the federal government do not depend on the number of people in need or the cost of the drugs. While federal funding is the largest source of dollars for ADAP, Title II of the Ryan White (CARE) Act also allows state governments to contribute dollars to the state program. The result of this federalist system of funding is varying degrees of support for ADAP throughout the fifty states. The Kaiser Family Foundation concludes, "ADAPs may also receive state general revenue support and other funding, but these other sources are highly variable and dependent on local decisions and resource availability. Each state administers its own ADAP with broad latitude over program design, including determining who is eligible and what drugs are offered" (Kaiser Family Foundation 2004).

In recent times, because of state budget shortfalls, funding for ADAP has been hard to find. As a result, many states have made significant cutbacks in the funding level for the program and are more heavily relying on federal dollars. Although funding for the program increased nine percent between Fiscal Year 2002 and Fiscal Year 2003, costs of drugs are rising and demand is growing. Therefore, many states are altering ADAP programs by creating waiting lists, developing restrictive formularies, and changing the eligibility criteria. Despite an increase in the program funding throughout the aggregate of the states, five states are facing net decreases in their budgets for ADAP. Moreover, many more states are facing decreases in the state contribution to the program (Kaiser Family Foundation 2004).

What accounts for this variance between the fifty states? Do certain socio-economic, political, or demographic barriers result in higher levels of funding by certain state governments? This paper will focus on variables that may account for the total state contribution to ADAP. In an attempt to explain large variations in state contributions, I will analyze race, federal contributions, income level, political affiliation, gender, program size, quality and population with AIDS. In order to do so, I will conduct a cross-sectional empirical regression analysis.

I. Literature Review

Little research of AIDS has been conducted from a broad economic perspective. However, general economic research concerning certain aspects of health care is relevant to the study of AIDS. Additionally, the literature on the public policy and political aspects of AIDS is growing, as the issue begins to amount to a global concern. Lastly, research specific to the Ryan White (CARE) Act or to the ADAP program is not extensive and traditionally amounts to only a reference line in a broader article. Given the recent difficulty of funding, ADAP and the essential need of clients to receive appropriate drugs for survival, more studies regarding programs to help poor HIV/AIDS patients are clearly necessary.

An important issue related to the ADAP program concerns the use of formularies to lower costs by restricting drug access. Colorado has a formulary of 18 drugs, while New York's ADAP formulary contains 474 drugs. Schweitzer raises the question of whether or not society believes health care should be of a universal quality or if it should have variations in quality and price (Schweitzer 1999). He argues that more generous plans will face higher costs and thus will have a higher price tag. An individual consumer's choice for the quality of the managed care plan selected can be applied to the state choice. Any state based plan that is very generous will reflect a higher price to the state. Thus, in regards to the "generosity level" of the ADAP plan selected, each state must determine the price it is willing to pay. Are the reasons for differences in state contributions the result of quality decisions? While the formulary offered by a program is not a perfect indicator of the quality of the drug coverage, for ADAP the extensiveness of the drug formulary is the best measure of coverage. Such a measure is reliable in light of the fact that some states have formularies so short that drugs recommended by the federal government are not even covered. Some may argue that the eligibility range for each state is also a good measure of quality. However, although New Jersey covers individuals up to 500 percent of the poverty level and North Carolina only covers up to 125 percent of the poverty level, variances in eligibility requirements are more directly related to the income structure of the state – not the quality of the program in place.

Moore and Newman analyze the consequences of drug formularies on Medicaid costs. According to Moore and Newman, states operating under restricted formularies face lower drug costs than states operating under open formularies (Moore and Newman 1993, 73). However, economic theory predicts that demand for non-pharmaceutical services should increase after states implement a restricted formulary. Thus, although the restricted formulary may result in states facing lower costs concerning drugs, the Medicaid recipient may have to substitute towards more costly medical treatments. For this reason, Moore and Newman conclude that restricted formularies do not lower the costs faced by states (Moore and Newman 1993, 73). The logic of Moore and Newman implies that states with less generous formularies will face lower costs within ADAP, but the state will ultimately face higher costs for non-pharmaceutical treatment through other programs such as Medicaid. Either way, formularies are an important measure of quality that will likely influence the state contribution to ADAP.

In many states, the majority of clients on ADAP are members of a racial minority group. In the states where minorities make up less than 50 percent of the clients, minority groups are usually proportionally over-represented. Schneider argues that many illegal drug policies around the country are racially biased and result in higher HIV/AIDS rates among minorities (Schneider 1998, 427-446). Schneider's argument does not concern the distribution of drugs for medicinal purposes – rather, she looks at state law regarding the arrest of illegal drug users and dealers.

From the statistics, she concludes that unprotected sex and injected drug use is no higher among African Americans than among whites. Unfortunately, discriminatory state laws concerning clean needles, treatment programs, and police targeting of specific races for arrests has helped to increase the AIDS rate among racial minority groups. For example, she cites that many states have a ban on clean syringes distribution even though state officials know that such a ban will have a disproportionate HIV/AIDS impact on minorities. This is important because illegal drug users account for fifty percent of new AIDS cases and the clean syringe bans disproportionately influence minority AIDS rates. If Schneider is correct in regarding state policies as a source of the AIDS infection, could a bias in the funding of AIDS assistance (ADAP) exist because of racially discriminatory policies passed by the legislature? Hogan, who cites differences between the different genders and sexual orientations, extends the logic of social bias in preventative policies even further among demographic groupings (Hogan 2001).

In addition to racial bias in the policy, Johnson and Schoeni speculate that family and neighborhood backgrounds are important to health quality outcomes. In accordance with economic theory, individuals will determine where to live based on preferences. Those individuals who place less of an emphasis on high quality health areas will be more likely to live in high pollution, crime, and drug areas. Individuals who do not prioritize health quality are likely to be low-income residents and disproportionately minority races. Such a view raises the question of whether economic mobility will allow disadvantaged families to obtain better health care in adulthood. Johnson and Schoeni conclude that neighborhoods are important to inequalities in health outcomes (Johnson and Schoeni 2003). If race drives health preferences, race and disadvantaged background may also drive health care policies in the state budget. Put more broadly, if the state is viewed as a neighborhood, the racial composition and poverty level of the state may reduce the amount of money spent on health programs such as ADAP. States with large poor and minority neighborhoods may prioritize other government programs before health care programs. Thus, race may have an impact on expenditure in two manners. First, if discrimination exists, spending will be lowered according to Schneider. Second, if different races have varying preferences regarding health care, spending levels may be altered according to Johnson and Schoeni.

In addition to quality and race, political factors can be seen as contributing to the level of funding. Carpenter analyzed political factors in the general drug approval process (Carpenter 2002, 490-505). While his study did not concern AIDS drugs in particular, similar political motives are applicable. Carpenter concluded that the political ideology of the Congress could shift the agenda of the Food and Drug Administration. To support this, he conducted an empirical analysis using dummy variables: a Democratic majority in the House, Senate, and a Democratic President were all coded one. While his results were not consistently positive and some results had small significance levels, Carpenter concluded that ideology matters. However, the extent that ideology matters is not as strong as hypothesized because the media, interest groups, and citizens temper politics. Therefore, the influence of the media and citizen groups is influential in taming partisan politics. Nevertheless, AIDS can be a very politically polarizing issue. Do Democrats and Republicans differ significantly in how much each party is willing to allocate to help people with AIDS? Carpenter's speculation about the media and interest groups may be less applicable to ADAP because of a lack of public information on the program and a lack of information on the budget process in general.

The last important factor is the influence of income and socio-economic variables on drug programs. Income and poverty levels of the states may directly affect the relative amount

of federal aid that is received, in addition to the state contribution to a program. In a study of the Canadian provinces, Grootendorst and Levine concluded that socio-economic and income variables had little influence on drug coverage by individuals who did not qualify for social insurance. However, those individuals who qualified for social assistance were the most responsive to price changes, co-payments, and restrictions based on formularies. Therefore, for social assistance clients, income and broader socio-economic variables such as race and gender matter (Grootendorst and Levine 2002). Again, the logic of Johnson and Schoeni also applies. Low-income individuals may prefer health care at a different level than wealthier individuals. Are states with more low-income ADAP clients more willing to help support the program? Alternatively, are states with more low-income clients just relatively poorer overall when compared to other states and thus unable to contribute more to the program?

Weisbrod writes that health care is a normal good. However, although the relationship between income and health care is positive, Weisbrod also concludes that health care expenditures rise relatively more slowly than income – with all other things equal (Weisbrod 1961). It appears that health care is a normal good, but that the expenditure on health care is slightly inelastic. However, although health care is a normal good, there is no evidence to suggest that AIDS drugs are normal goods. In fact, as the income of a state rises, economic theory may suggest that the demand for ADAP will go down since low-income individuals are more likely to have AIDS. Either way, personal income should be viewed as a budget constraint, but other factors than income are also responsible for changes in health care demand. Weisbrod concedes that factors such as tastes, disease rates, and changes to technology can rapidly alter demand.

II. Additional Economic Perspectives on AIDS

Worthy of note is the economic literature which views AIDS and the contraction of AIDS as a negative externality to the population. For example, Philipson and Posner established an economic model of risky sexual behavior. He concluded that such behavior has a negative externality on the remaining population through the possibility of spreading AIDS (Philipson and Posner 1993). Bayer, in a non-economic perspective, shared a similar viewpoint on how the AIDS virus has unintended social consequences beyond the consequences to the individual (Bayer 1989). Such negative social outcomes can be as simple as spreading the virus to others via certain forms of contact to the much broader consequence of instilling a fear in the general population. Since the government or insurers cannot determine who is engaging in risky sexual behavior and who is not engaging in risky sexual behavior, some of the costs of these risky behaviors are deferred to other individuals.

In the case of private insurers, Philipson and Posner conclude that insurers should be allowed to exclude persons who have a high risk of contracting AIDS to prevent social costs from rising. They argue that such a policy is efficient because it reduces the externalization of the costs of AIDS. Philipson and Posner note that on the other hand, shifting the costs to other individuals is offset by some external benefits. In the case of the ADAP program, all of the additional costs of ADAP are passed on to society since tax dollars pay for the program. Philipson and Posner would argue each state must individually weigh the social benefits and costs of AIDS in the state before determining at what level to fund the program. Using their logic, a negative contribution by the state government is a feasible outcome if the social costs are of a greater magnitude. They make clear that viewing AIDS as a negative externality does not

make the value of life for a person who engages in risky sexual behavior any less valuable than a person who engages in safe sexual behavior (Philipson and Posner 1993).

Lastly, AIDS health policy is not the only expenditure cost that the federal and state governments will be facing in the future. Lee and Amo notes that health care financing for AIDS patients is the most pressing issue regarding AIDS, but that other areas of high expenditures are emerging for state governments to combat (Lee and Amo 1987). Other important areas that will compete for AIDS funds at the state level include AIDS research, community education programs concerning AIDS, containment policies, the development of hospital and non-hospital services for AIDS, and counseling programs. In an era where competition for dollars is tough in state budgets, difficult policy questions concerning AIDS could greatly influence the level of financial contribution that states can make to the ADAP program.

III. An Economic Model for State ADAP Financing

The annual expenditure level for ADAP varies greatly between the fifty states. Thus, a cross-sectional analysis of data from the states can help explain why some states spend more money for AIDS drug assistance. Using the logic mentioned above, I have carefully selected my dependent and explanatory variables. The relationship I will analyze takes the general function form:

$(1) \qquad E = f(F, A, P, D, I, L, M, R, G, S, H, \ldots)$

where the variables are defined as:

E total expenditure contributions by the state government on ADAP for Fiscal Year 2003 (includes state contributions to Title II funds, state general revenue funds, and some contributions from local governments to the state)[2]

F total federal expenditure contributions to the state on ADAP for Fiscal Year 2003 (includes federal ADAP earmark and ADAP supplemental)[3]

A total ADAP prescriptions filled in the state (June 2003)[4]

P estimated number of persons living with AIDS in the state (end of 2002)[5]

D total number of drug medications on the state formulary (2003)[6]

I per capita personal income for the state (2002)[7]

L percent of ADAP clients served in the state who are below the federal poverty level (June 2003)[8]

M percent of ADAP clients served in the state who are male (June 2003)[9]

R percent of ADAP clients served in the state who are a racial minority – not white (June 2003)[10]

G political party of the Governor of the state during the budget process for Fiscal Year 2003 (coded: 0 = Republican and 1 = Democrat)[11]

S majority political party in the state Senate during the budget process for Fiscal Year 2003 (coded: 0 = not controlled by Democrats and 1 = controlled by Democrats)[12]

H majority political party in the state House of Representatives during the budget process for Fiscal Year 2003 (coded: 0 = not controlled by Democrats and 1 = controlled by Democrats).[13]

It is important to make a few notes concerning the data. First, the financial data is collected on a fiscal year basis. The state fiscal year varies among the fifty states and can vary

from the federal fiscal year. Nonetheless, all of the other data lines match up with the given fiscal year, in this case 2003. However, it is impossible to know which year's data the state legislators and the Governor possessed when they made the decisions concerning the allocation of expenditures. Most of the data used as explanatory variables could not have changed by extreme amounts that would make a statistical significance. Additionally, any of the variables that specify the month of June only apply to clients seeking services in that month. Annual data for percentages of clients based on income, sex, and race are only tracked one month a year. The percentage data for the month of June is an imperfect estimate for the yearly percentages. While these percentages are not perfect, ADAP estimates that a supermajority of its clients is serviced on a monthly basis.

The last concern regarding the explanatory variables is a note on the political variables. Two states had governors that had Independent party affiliations. In these two states, I analyzed the tendencies of the Governor and historic votes in the gubernatorial election, then assigning the Independent governors either a 0 or a 1.[14] Furthermore, the state of Nebraska has a unicameral legislature with non-partisan elections. However, after looking at the political affiliation of the national congressional delegation, inferences were drawn and I coded the Nebraska legislature rather than dropping the whole state from the analysis.[15] Using a Democrat and non-Democrat dummy versus a Republican and non-Republic dummy makes little difference to the model, except in the interpretation of the coefficient. Lastly, in a small number of cases, a branch of the legislature had an equal number of Democrats and Republicans elected. If such was the case, the state was coded a 0, since Democrats were not in control as the majority party. Majority control of the legislature requires a clear majority, rather than a shared power structure in the house.

It is also important to discuss the selection of the dependent variable. When selecting a dependent variable, I had the choice of the total state contribution to ADAP, the state contribution to ADAP per client, the state contribution to ADAP per person living in state, or the state contribution to ADAP per person living with AIDS in the state. I selected the first option. I eliminated the expenditure per person option because the average person has little knowledge about the program and the dollar value per person is small enough that the average individual probably would not be sensitive to an increase of a few cents. The expenditure per client and the expenditure per person with AIDS variable are not the best options because of the nature of the program. Since ADAP is a discretionary – non-entitlement – program, the government does not base decisions for funding allocations on the numbers served. The number of clients served is simply only one factor in the amount of funding. The level of total expenditures most certainly will vary by the number of clients, but the participation rate is only one component of this aggregate amount. The budget process by its very nature, forces the legislature and the Governor to propose and vote on an aggregate amount. This aggregate state amount is therefore a good dependent variable to analyze quality, racial, income, and political decisions.

IV. Hypotheses

From equation 1, given that E is a function of the explanatory variables, I propose the following hypotheses. The null hypothesis that I am trying to disprove is denoted H_0 and the expected alternative hypothesis is written as H_A.

H1: F and E will be negatively correlated ($H_{01}: \beta_F \geq 0; H_{A1}: \beta_F < 0$). Thus, the higher the level of the federal earmark, the smaller the amount the state will feel obliged to contribute or can contribute.

H2: *A* and *E* in addition to *P* and *E* will be positively correlated (H_{02}: $\beta_{A, P} \leq 0$; H_{A2}: $\beta_{A, P} > 0$).
     Corollary 1 of H2: States that cover more ADAP clients will allocate more funds to the program (H_{02}: $\beta_A \leq 0$; H_{A2}: $\beta_A > 0$).
     Corollary 2 of H2: States with larger populations with AIDS will allocate more funds to the program (H_{02}: $\beta_P \leq 0$; H_{A2}: $\beta_P > 0$).

H3: *D* and *E* will be positively correlated (H_{03}: $\beta_D \leq 0$; H_{A3}: $\beta_D > 0$). Based on Schweitzer (1999), higher quality state programs will result in greater state contributions.

H4: *I* and *E* will be positively correlated and *L* and *E* will be positively correlated (H_{04}: $\beta_{I, L} \leq 0$; H_{A4}: $\beta_{I, L} > 0$).
     Corollary 1 of H4: Rich states will be financially able to contribute more to ADAP in the aggregate (H_{04}: $\beta_I \leq 0$; H_{A4}: $\beta_I > 0$).
     Corollary 2 of H4: States with more poor clients served will fund ADAP at a higher level because of a broader socio-economic need for more funding than richer states and a historical reluctance to impose costs on the extremely poor (H_{04}: $\beta_L \leq 0$; H_{A4}: $\beta_L > 0$).

H5: *M* and *E* will be positively correlated, but *R* and *E* will be negatively correlated (H_{05}: $\beta_{M, R} = 0$; H_{A5}: $\beta_{M, R} \neq 0$). Given Schneider (1999) and Hogan (2001), a racial and gender bias will emerge against minorities and females.
     Corollary 1 of H5: States with a higher percent of male clients will allocate more funds (H_{05}: $\beta_M \leq 0$; H_{A5}: $\beta_M > 0$).
     Corollary 2 of H5: States with a higher percent of minority clients will allocate fewer funds (H_{05}: $\beta_R \geq 0$; H_{A5}: $\beta_R < 0$).

H6: *G* and *E*, *S* and *E*, in addition to *H* and *E* will be positively correlated (H_{06}: $\beta_{G, S, H} \leq 0$; H_{A6}: $\beta_{G, S, H} > 0$). Given the positions of Democrats and Republicans on moral issues that surround AIDS, states under the more liberal Democratic ideology will be more likely to support AIDS assistance programs.
     Corollary 1 of H6: States with Democratic Governors will spend more on ADAP (H_{06}: $\beta_G \leq 0$; H_{A6}: $\beta_G > 0$).
     Corollary 2 of H6: States with Democratic controlled Senates will spend more on ADAP (H_{06}: $\beta_S \leq 0$; H_{A6}: $\beta_S > 0$).
     Corollary 3 of H6: Democratic controlled House of Representatives will spend more on ADAP (H_{06}: $\beta_H \leq 0$; H_{A6}: $\beta_H > 0$).

V. Methodology

Microsoft Excel was used to conduct a multiple linear regression using ordinary least squares. The confidence level is defined as the probability ($\propto$) willing to be accepted for rejecting a true null hypothesis. For my analysis I set $\propto = 0.05$, thus creating an upper and a lower 95 percent confidence interval. As a significance measure, I assumed any results with a t-stat of an absolute value of 1.95 or greater for two-tailed tests or of a value of positive/negative 1.65 for one-tailed tests and a p-value of .05 or less are statistically significant.

Essential to note is that such a model can only disprove the null hypothesis and cannot prove any statement correct. For this reason, it should also be noted that this model does not capture every aspect that influences state contributions to ADAP. This model attempts to capture a variety of factors that scholars cited in the literature review believe to be important to health coverage. Therefore, the introduction of other variables that are not included could potentially influence the strength of the correlation or even the direction of correlation (Santerre and Neun 2004). However, given the dependent variables and the assumed linear relationship, the results lead to the rejection of certain null hypotheses.

VI. Empirical Results

The regression analysis yielded several strong results. The total sum of squares, or R^2, signifies the percent of the variation in the dependent variable that is "explained" by the proposed regression model established. For this model, $R^2 = 0.978$, with the total number of observations equal to 50, the number of states. The adjusted $R^2 = 0.971$ and this value would only increase should another variable of significance be added. Please refer to Table 1 for this data. The results in this table and all of the following tables have been rounded to the closest three decimal places.

The actual results for the linear regression, including the coefficients and the significance levels, are listed in Table 2. All variables have a favorable t-stat and p-value with the exception of race, gender, client income, and House party variables. Therefore, I cannot significantly disprove anything concerning these four variables. However, all of the other variables have favorable significance levels and therefore I can make conclusions about the null hypotheses for the high significant variables.

Using these variables, the following equation can be written:

$$(2) \quad E = \beta_0 + \beta_F F + \beta_A A + \beta_P P + \beta_D D + \beta_I I + \beta_L L + \beta_M M + \beta_R R + \beta_G G + \beta_S S + \beta_H H.$$

Moreover, using the regression results, with β rounded to the nearest whole integer, the equation is as follows:

$$(3) \quad E = 9900598 - F + 818A + 2256P - 16108D - 172I - 1818677L - 5880158M - 360670R + 1837045G + 1797531S - 668131H.$$

VII. Economic Analysis of Results

Before analyzing the four areas of drug programs that I specified in the literature review, I would like to discuss the initial control variables (F, A, and P). These three variables had the highest significance t-stats with p-values of almost zero. The federal expenditure, the size of the ADAP program, and the number of people affected by AIDS thus contribute in large amount to the level of spending states are willing to contribute. In regards to the federal contribution, the coefficient value in significantly negative. Therefore, I can reject H_{01} in favor of H_{A1}. As the federal government is willing to contribute more to a state, the amount the state is willing to contribute is reduced. In such a model of decision-making, the state government looks at the amount they expect to receive and decides whether they need to supplement it based on the characteristics of the population. From this regression, I can make no conclusions about how the federal government determines how the federal earmark is divided among the states. Because the program is discretionary, federal dollars are not entirely distributed based on a formula for

the number of clients. Similar studies to this one must be conducted to see if the federal government distributes dollars based on state income, characteristics of clients in the program, or whether the allocation is discretionary and arbitrary.

The total number of ADAP prescriptions (A) and the total number of persons living with AIDS (P) both have significantly positive coefficients. Therefore, I can reject H_{02} in favor of H_{A2} in terms of both corollary one and two. The number of ADAP prescriptions distributed simply controls for the size of the program. The obvious reason is that a state that funds more prescriptions each month will need to spend more money simply due to the size of the program. P on the other hand is different from the number of prescriptions served. A is limited to a certain portion of the larger population, P, by regulations and restrictions established by the state. Therefore, the number of prescriptions distributed is not a direct result of the number of people living with AIDS, but rather the guidelines the state establishes concerning whom they will serve. A positive value for the coefficient of P suggests that as a state has a larger population of people with AIDS, a greater demand for ADAP emerges. Additionally, a larger AIDS population can create additional pressures on the state government to expand the program by contributing more funds to it. Such an expansion of the dollars supplied could take the form of a larger formulary or a larger number of clients covered.

In terms of hypothesis 3, the number of drugs on the formulary has a negative relationship with expenditures. Additionally, this correlation is extremely significant, more so than any of the variables not yet discussed in the analysis. Thus, this result fails to reject the null hypothesis, H_{03}. Therefore, as the number of drugs on the formulary list goes up, the state contribution goes down. Such a conclusion seems to suggest that those states favoring a more comprehensive quality program are willing to spend less – perhaps at a loss to other variables such as quantity. Schweitzer noted that plans that are more generous would be more expensive because "the most generous plans would add coverage of treatments that were more costly per expected gain in outcome. Of course, more generous plans would be more costly" (Schweitzer 1999, 4). This study suggests that as plans become more costly for the state from more extensive coverage, perhaps the state finds other means to reduce costs such as restricting access to the program. Nonetheless, states with very high quality programs seem to have the least amount of funding directed to ADAP. Perhaps as fewer drugs are covered, states believe that they are providing the drugs with the largest marginal benefit compared to marginal costs. Thus, states with small formularies may believe that little waste exists in the program and, therefore, are willing to contribute additional dollars.

Grootendorst and Levine concluded that income variables have very little influence on the expenditure decision of individuals (Grootendorst and Levine 2002). However, the coefficient for per capita personal income of a state was negative and this correlation was significant given the t-stat. Such a conclusion fails to disprove the null hypothesis, H_{04}, for corollary one. States with a higher per capita personal income are in fact less inclined to support larger amounts of funding for ADAP. Therefore, those states with larger expenditures appear to help redistribute larger amounts to poorer clients. While richer states can view themselves as having a greater ability to pay more, some thoughts suggest that richer states spending less makes perfect sense. The states with lower per capita personal income will have a larger demand for the ADAP service, on average. The lower the per capita income of a state, the more likely an AIDS patient will need financial assistance. If anything, Grootendorst and Levine's logic of the effect of income on the individual cannot be successfully applied to the state.

Using the said logic, then, states with a larger number of clients below the federal poverty level should contribute a larger amount to the program. If anything, the model suggests that such a relationship is not true as evidenced by a negative relationship between *L* and *E*. However, such a conclusion cannot be substantiated, because the significance level of the t-stat is too low to conclude with certainty. Therefore, we fail to reject the null hypothesis, H_{04}, of corollary two. The validity in income as a contributing factor to state AIDS spending must be the subject of further research. One of the reasons for a lack of correlation with the percent of clients below 100 percent of the poverty level is that given the extremely high costs of drugs, people above the poverty level also have difficulty paying for drugs. Perhaps because AIDS drugs cripple the incomes of anyone in need, a benchmark of 200 percent or 300 percent of the federal poverty level should be analyzed. Furthermore, varying state standards in terms of what percent of the federal poverty level is required to qualify for the program may also have consequences on the significance of the poverty variable, *L*.

For both corollary one and two of hypothesis five, neither of the coefficients for *M* or *R* are significant enough to reject the null hypotheses. In fact, in the case of *R*, the t-stat was almost zero. For *M*, the t-stat was only -1.1. Although the coefficients were negative, for an $\propto =$ .05, the coefficients could very well be positive or negative given the large standard deviations. Therefore, no evidence of a gender bias against females or a racial bias against minorities can be assumed from the cross-sectional analysis. However, this does not prove that every state is bias free and a small number of states may have biases in their funding. The percent of males and the percent of minority clients make no difference in terms of the funding in this overall model. Although AIDS is sometimes used to stereotype homosexuals and racial minorities, this study seems to indicate a sense of equity for at least minorities in terms of funding allocations. The failure to prove a policy bias is heartening, in light of constitutional (14th Amendment) prohibitions against discrimination.[16] I suggest the social attitude and political pressures against racial and gender discrimination have been increasing over time. As discrimination based on race and gender become less accepted, the significance level on these two variables appears to have been lost.

Lastly, Carpenter concluded that politics matters in relation to drug policy – although he qualified the importance of politics by showing proof that the media, citizens, and interest groups have tempered the influence of politicians and political ideology. The data analysis disproves the null hypothesis, H_{06}, of both corollary one and two. The sign of the coefficient for both *G* and *S* was positive and large. Additionally, the t-stat for both values are well over 2.5 with the t-stat for *G* nearly 3. However, the sign of the coefficient for *H* is negative, but the t-stat is only -0.9. In light of a low t-stat, the null hypothesis, H_{06}, for corollary three cannot be rejected. However, the coefficient on *H* may be insignificant due to multi-collinearity between *H* and *S*. Because the values of *H* and *S* are likely to be correlated, the multi-collinearity will result in one of the variables becoming insignificant. These two variables may also be correlated with *G*. This correlation appears to exist in the model and future studies should seek to develop one defined political index that appropriately weights the values of *H*, *S*, and *G* into one common variable.

In terms of the overall impact of political ideology on AIDS funding, the results are uncertain. The sizeable t-stat on the values of partisan ideology for the Governor and the Senate suggest that politics matters in the decision-making process. Further studies that analyze the legislature and the Governor in more detail are necessary for conclusive results. The values for the Senate may be more significantly correlated, in that it is a much smaller body than most state

Houses of Representatives. The strong coefficient of G makes most sense, given that states operate under an executive budget process where the formulation of the budget numbers by the executive is highly influential. Furthermore, ideology may play less of a role in the House because individual members are less powerful and are more closely accountable to citizens living in their district. Also, Representatives are more election sensitive because of a smaller incumbency advantage, which may alter ideology in the decision-making process. However, it does appear that ideology can be important in funding decisions. It is important to note that although ideology can matter (in this case – the Governor and Senate), ideology does not have to matter (the House). Carpenter is justified. According to my study, I can conclude that politics is important. Nonetheless, the characteristics of the body and other outside factors appear to temper partisanship.

VIII. Ranking the States

From the data and the residuals, I can rank states in terms of the difference between the actual spending level and the predicted spending level. From the residuals, I have created a relative measure, γ, which is equal to the following:

(4) γ = (Actual Value – Predicted Value) / (Predicted Value).

I calculated the relative measure and verified that the sign was appropriate for each of the states. In cases where the state is "under-spending," the sign of γ is negative. The more negative the value of γ, the greater the relative under-spending. When the state is "over-spending," the sign of γ is positive, with high values indicating greater relative over-spending. In cases where the index is tied, the states were then ranked by the magnitude of the expenditure over or under-spent. Please refer to Table 3 for specific results.

A value of -1, indicates the state expended zero dollars, when the model predicts the state should expend a positive dollar amount. On the other hand, a value of 1 indicates the state is not contributing to the ADAP program, when the model predicts the state should contribute a dollar. amount. Those states with a value greater than 1, are actually contributing dollars to the ADAP program, but the model predicts the states should contribute a negative amount. Whether or not spending a negative amount is possible can be questioned, however, many states that should spend a negative amount have either a low number of total clients or receive a high amount of federal dollars in relation to the population. Perhaps spending a negative amount implies a necessary reduction to F. Many of the states that fall closest to zero, $-0.250 \leq \gamma \leq 0.250$, are in fact very large states with a high number of ADAP clients and a large budget. While the precise ranking is ultimately not important, what is significant is whether γ for each individual state is greater than or less than zero. Such a benchmark serves as an indicator of whether the state should spend more or less, given the state's selected characteristics.

IX. Conclusions

The AIDS epidemic is a serious and growing problem in the international community and within America's own borders. In Africa, the epidemic is growing in the number of AIDS cases. In America, the epidemic is growing in terms of the financial costs of caring for a HIV/AIDS patient. Because of increasing costs for drugs that are required for survival, the federal government passed the ADAP program to help poor clients living with AIDS. The amount that each state expends on the ADAP program is a function of a number of variables.

Federal support, the size of the population with AIDS, and the size of the ADAP program are all significant in determining state spending. When controlling for these variables, higher quality programs that have more extensive formularies results in a lower dollar amount of funding. The influences of the profile of the client pool in terms of income, gender, and race are not significant in determining the level of expenditure. No biases against the characteristics of the client pool are substantiated. However, states with a higher per capita income are less willing to spend more. Lastly, political ideology appears to matter, but is restricted by legislative and external political characteristics.

All of these results are important to help states determine an optimal level of expenditure for a state of certain characteristics. Clearly, AIDS funding is an area that has received little study and more empirical research must be conducted in the near future. Examples of future studies could look at variables that drive federal spending. Furthermore, more studies can expand state level variables. In doing so, additional dependent variables such as the state expenditure per client and the state expenditure per person living in the state should be analyzed. Understanding what drives high expenditure levels in the states is essential to optimizing spending and making tough public policy decisions, in a world where certain programs such as ADAP are forced to compete with other AIDS programs and other general programs in the state budget. The results of this study are increasingly helpful, as policymakers must make tough decisions in terms of whether to reduce or expand ADAP in quantity or quality because of fiscal constraints.

X. Data Appendix

Table 1: Regression Statistics	
Multiple R	0.989
R Square	0.978
Adjusted R Square	0.971
Standard Error	2010136.241
Observations	50.000

Table 2: Empirical Results						
Variables	**Coefficients, β**	**Standard Error**	**T-stat**	**P-value**	**Lower 95 Percent**	**Upper 95 Percent**
Intercept, β_0	9900597.884	5721402.770	1.730	0.092	-1681776.897	21482972.666
Total federal expenditure, F	-1.132	0.105	-10.766	0.000	-1.345	-0.919
Total ADAP prescriptions, A	817.955	64.963	12.591	0.000	686.444	949.465
Number of persons living with AIDS, P	2255.882	212.916	10.595	0.000	1824.856	2686.908
Number of drugs on the formulary, D	-16108.143	4617.779	-3.488	0.001	-25456.348	-6759.938
Per capita personal income, I	-172.321	82.524	-2.088	0.044	-339.382	-5.260
Percent of clients below poverty, L	-1818676.578	1470140.343	-1.237	0.224	-4794820.213	1157467.057
Percent of clients who are male, M	-5880157.923	5385007.022	-1.092	0.282	-16781535.091	5021219.246
Percent of racial minority clients, R	-360669.722	2146361.704	-0.168	0.867	-4705751.980	3984412.537
Political party of the Governor, G	1837044.585	624261.499	2.943	0.006	573293.205	3100795.966
Majority party in state Senate, S	1797530.984	711325.247	2.527	0.016	357528.256	3237533.712
Majority party in state House, H	-668131.009	750324.676	-0.890	0.379	-2187083.958	850821.940

Table 3: Relative State Under / Over Spending		
Rank	**State**	**(Actual-Predicted)/Predicted, γ**
1	Utah	-1.000
2	Arkansas	-1.000
3	Tennessee	-1.000
4	Iowa	-1.000
5	New Jersey	-1.000
6	Rhode Island	-1.000
7	Delaware	-0.972
8	Louisiana	-0.952
9	Maine	-0.887
10	West Virginia	-0.843
11	Oregon	-0.807
12	South Carolina	-0.770
13	Massachusetts	-0.739
14	Kentucky	-0.731
15	Hawaii	-0.678
16	Minnesota	-0.641
17	Connecticut	-0.517
18	Alabama	-0.453
19	Arizona	-0.440
20	Vermont	-0.203
21	Pennsylvania	-0.168
22	Colorado	-0.117
23	New York	-0.084
24	Texas	-0.051
25	Virginia	-0.010
26	Illinois	-0.010
27	California	0.036
28	Alaska	0.042
29	Georgia	0.130
30	New Hampshire	0.144
31	North Carolina	0.209
32	Florida	0.210
33	Washington	0.242
34	Ohio	0.278
35	Oklahoma	0.341
36	Missouri	0.354
37	Nebraska	0.835
38	Wisconsin	0.993
39	Michigan	1.000
40	Indiana	1.000
41	Montana	1.045
42	North Dakota	1.052
43	Wyoming	1.114
44	Maryland	1.150
45	Idaho	1.221
46	Mississippi	1.445
47	Kansas	1.644
48	South Dakota	2.588
49	New Mexico	9.608
50	Nevada	20.794

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XIII. Endnotes

[1] Kennedy, Edward M. 7 June 2000. "Senator Edward M. Kennedy Announces the Passage of the Ryan White CARE Reauthorization Act of 2000." http://www.kennedy.senate.gov/index_high.html

[2] Data calculated from: Kaiser Family Foundation web site. "National ADAP Budget by Source, FY 2003." http://statehealthfacts.org/

[3] Data calculated from: Kaiser Family Foundation web site. "National ADAP Budget by Source, FY 2003." http://statehealthfacts.org/

[4] Data Source: Kaiser Family Foundation web site. "Total ADAP Prescriptions Filled, June 2003." http://statehealthfacts.org/

[5] Data Source: Kaiser Family Foundation web site. "Estimated Number of Persons Living with AIDS at the End of 2002." http://statehealthfacts.org/

[6] Data Source: Kaiser Family Foundation web site. "ADAP Formularies, Number of Medications by Drug Class, 2003." http://statehealthfacts.org/

[7] Data Source: Bureau of Economic Analysis web site. "Per Capita Personal Income." www.bea.gov

[8] Data Source: Kaiser Family Foundation web site. "ADAP Clients Served by Income, June 2003." http://statehealthfacts.org/

[9] Data Source: Kaiser Family Foundation web site. "ADAP Clients Served by Sex, June 2003." http://statehealthfacts.org/

[10] Data calculated from: Kaiser Family Foundation web site. "ADAP Clients Served by Race/Ethnicity, June 2003." http://statehealthfacts.org/

[11] Data Source: Council of State Governments, The. 2003. *The Book of the States: 2003 Edition, Volume 35.* Table 4.1. Lexington, KY: The Council of State Governments.

[12] Data Sources: Council of State Governments, The. 2002. *The Book of the States: 2002 Edition, Volume 34.* Table 3.3. Lexington, KY: The Council of State Governments.
Council of State Governments, The. 2003 *The Book of the States: 2003 Edition, Volume 35.* Table 3.3. Lexington, KY: The Council of State Governments.

[13] *Ibid.*

[14] After analysis, the Independent Governor of Maine was assigned a value of 0 (Republican) and the Independent Governor of Minnesota was assigned a value of 1 (Democrat).

[15] Given the strong Republican leanings of the national congressional delegation and historic statewide election results on the national level, a value of 0 (non-Democratic control) was assigned for the partisan composition of the Senate and the House – even though Nebraska has a unicameral legislature with nonpartisan elections.

[16] *United States Constitution.* Amendment XIV. http://www.usconstitution.net/const.html