SCHOOL DISTRICT LEAVE POLICIES, TEACHER ABSENTEEISM, AND STUDENT ACHIEVEMENT

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ABSTRACT

In an effort to reduce salary costs, many school districts have begun to offer teachers financial incentives to retire early. Often, however, these districts have limits on the number of cumulated unused sick leave days that teachers may receive cash payments, credits toward future health insurance, or retirement credits for, at retirement. Thus, one might expect that in addition to stimulating early retirement, early retirement incentive programs may interact with sick leave provisions and provide an unintended incentive for increased teacher absenteeism. To the extent that less learning occurs when regular teachers are absent and student motivation to attend school is also reduced, student academic performance may suffer. This surely would be an unintended side effect of these policies.

To address these issues, this paper, which is based on an extensive data collection effort by the authors, presents an econometric analyses of variations in teacher and student absenteeism across the over 700 school districts in New York State in 1986-87 and of how such variations influence student test score performance.

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I. Introduction

In an effort to reduce salary costs, many school districts have begun to offer teachers financial incentives to retire early. Often, however, these districts have limits on the number of cumulated unused sick leave days that teachers may receive cash payments, credits toward future health insurance, or retirement credits for, at retirement. Thus, one might expect that in addition to stimulating early retirement, early retirement incentive programs may interact with sick leave provisions and provide an unintended incentive for increased teacher absenteeism. To the extent that less learning occurs when regular teachers are absent and student motivation to attend school is also reduced, student academic performance may suffer. This surely would be an unintended side effect of these policies.

Somewhat surprisingly, the study of the causes and effects of teacher absenteeism has received very little attention. The "educational production function" literature contains no references to the effects of teacher absenteeism on student academic performance, although a few studies have addressed the related topics of the effects of student absenteeism and the amount of weekly instructional time on student performance.[1] While there are numerous studies of the determinants of worker absenteeism by economists and industrial psychologists, only a small number of these deal with how sick leave policies influence absenteeism.[2]

Moreover, there have been only two studies of the effects of sick leave policy on teacher absenteeism. The first used data for 57 elementary schools in California and Wisconsin in 1974-75 and found that the presence of income protection plans (for long-term sick leave) was associated with higher absenteeism, while the requirements that teachers provide proof of illness and report illness directly to the principals were associated with lower absentee rates.[3] This study, conducted a decade ago, did not have data on a number of provisions governing sick leave in teacher contracts (such as number of leave days per year, maximum number of leave days teachers can cumulate, "pay-offs" to teachers for unused sick leave days, and the presence of a "sick-leave bank") that are important today. The second was a case study of one school district in New York State and showed, using before-after comparisons, that the institution of pay incentives for good attendance in 1986-87 was associated with a significant reduction in the district's mean number of sick days used.[4] The paucity of research on teacher absenteeism is undoubtedly due to the fact that data on teacher absenteeism are not regularly reported by school districts to state education departments and data on the leave provisions in collective bargaining agreements that teachers work under in each school district are not regularly tabulated anywhere.

This paper, which is based on an extensive data collection effort conducted by the authors, presents an econometric analyses of the variations in teacher and student absenteeism across the over 700 school districts in New York State (excluding New York City) in 1986-87 and of how such variations influence student test score performance. We begin in the next section by presenting the conceptual framework upon which our empirical work is based. Section III discusses the data we use and presents some descriptive statistics. Our econometric estimates are presented in section IV and their implications are discussed in a brief concluding section.

II. Conceptual Framework: Teacher Absenteeism, Student Absenteeism, and Student Test Score Performance

A. Teacher Absenteeism

Consider first how a school district's sick leave and other leave policies might be expected to influence teacher absenteeism. The nature of these policies, at least for tenured teachers, suggests that the appropriate framework to use is a life-cycle one that incorporates uncertainty. For expositional convenience we will act as if all teacher leave usage is sick leave usage; this assumption is relaxed in our empirical work.

Teachers use sick leave either for serious illnesses (when their health unambiguously prevents them from coming to work), for minor illnesses (when they have some discretion about whether to come to work) and, in the absence of requirements for doctor's notes certifying short illnesses, for additional paid "vacation" on days when they actually have no health problems. While in the aggregate teachers in a district have no control over their usage of sick leave for the first purpose, they do control the usage for the latter two purposes and thus absenteeism can be analyzed in a rational choice framework.[5]

We will consider the effects of four key aspects of teacher leave policies for which we have data. First, the annual leave days permitted per teacher. Second, the maximum number of unused leave days that can be cumulated and used (if needed) in future years. Third, whether teachers can receive either direct cash payments at retirement, subsidies for postretirement health insurance costs, or credit for additional service at the retirement date, for unused cumulated leave.[6] Fourth, the dollar value per day of unused leave to them if any of the latter forms of payment exist.

A simple model in which teachers value both leave days that they use and the payoff that they receive for cumulative unused leave days implies (see Appendix A) that ceteris paribus, the greater the number of days of leave granted annually, the greater the absentee rate will be. An increase in the payoff for unused days will, ceteris paribus, have an ambiguous effect on the absentee rate because it will have both income and substitution effects. While a higher payoff increases the cost of using sick leave days and therefore should decrease usage (substitution effect), it also increases teachers' wealth and this should increase usage (income effect). The net effect of higher payoff rates on teacher absenteeism is thus an empirical question.

Of course, teacher absentee rates will vary across school districts for a number of reasons other than leave provisions and these must be controlled for in our empirical analyses. For example, factors that influence teachers' disutility of work (or the value they place on leave days) surely matter and a school district's characteristics such as its size or whether it is in an urban area may matter. Similarly, factors that influence the incidence of illness among teachers, such as the incidence of illness among students and the age distribution of teachers surely matter.

The life-cycle aspect of absenteeism decisions arises because teachers' preferences for paid leisure (the third use of sick days) may vary both over their life-cycles and with whether they have tenure and because of the possibility that a serious illness may arise that requires them to use in a year more than the number of sick leave days they are granted eligibility for in that year. In the absence of having cumulated unused sick leave days from previous years, a serious illness that exhausted current year sick leave days could lead to a substantial earnings loss.[7] Since the incidence of such illnesses are a priori highly uncertain, teachers will have a precautionary demand for sick leave days and will want to accumulate some unused days across years. Of course, some school districts do have "sick leave banks" from which a teacher who has used up his or her sick leave can "borrow" days from other teachers in the district. The existence of such sick leave banks will reduce teachers' precautionary demand for unused sick leave days and should lead to increased teacher absenteeism. More generally, one would expect to observe teachers accumulating sick leave days when they are young and then "spending" them as they near retirement. So for this reason also, the age distribution of teachers in a district should affect its absentee rate.

The maximum number of leave days that teachers can cumulate should also affect annual usage. If cumulated days can not be "cashed in" at retirement, an increase in the maximum number of days that can be cumulates might be expected to decrease absenteeism for young teachers (in the "saving" phase of their life cycle) but increase absenteeism for older teachers (in the "drawing-down" phase). While on balance the effect on the district-wide absentee rate is ambiguous in this case, if cumulated days <u>can</u> be cashed-in, one would expect an increase in the number of days that can be cumulated to be associated with a lower district-wide absentee rate.

In this life-cycle framework, early retirement incentive plans that induce some people to retire earlier than would otherwise be the case will likely increase the absentee rate of older teachers (they will have a smaller number of years left to "use up" their cumulated leave days). In theory, then an unintended short-term side effect of such plans will be increases in teacher absentee rates.[8]

The discussion above leads to the specification of teacher absenteeism equations of the form

$$(1) \qquad A_i = F^A(L_i, R_i, T_i, D_{Ai}, S_i) + \epsilon_{Ai}$$

Here A_i is the absentee rate of teachers in school district i, L_i is a vector of contract provisions that govern teacher usage of leave days in the district, R_i is a dichotomous (1,0) variable that takes on the value of one if an early retirement incentive program is in effect in the district, T_i is a vector of teacher characteristics in the district, D_{Ai} is a vector of characteristics of the school district (e.g., size) that might be expected to influence the absentee rate of teachers in the district, S_i is the absentee rate of students in the district, and ϵ_{Ai} is a random error term.

B. Student Absenteeism

What are the factors that one might expect would influence the absence rate of students in a school district? As with teacher absenteeism, we can distinguish three different types of student absenteeism in theory, although we can not separate them out in our data.

First, some absent students have serious illnesses that render them unable to attend school. Second, some have minor illnesses (e.g., minor colds) and potentially could attend (without infecting their classmates) if they chose to do so. Third, some are not ill at all and have either tricked their parents into believing they are ill and/or are truants who are absent without justification.

The first type of absenteeism is likely to depend primarily on unobservable factors (e.g., the incidence of illnesses across school districts) although district wide economic variables (e.g., family income) may influence the nutrition that children in the district get and hence their health. If these unobservable factors simultaneously increase the incidence of illness among teachers and students, higher teacher absentee rates may also be positively correlated with higher pupil absentee rates.

The latter two types of student absenteeism are more the results of choice made by students in the district. Characteristics of teachers in the school district (e.g., age or gender) may affect these choices. The age distribution of students in a district may also matter, as elementary grade students may be more likely to stay in bed in response to a minor illness but less likely to be truant. Socioeconomic variables that reflect the value that parents in the community place on education (e.g., family income or parental education) also likely will matter, as will the size of the district. Finally, higher teacher absentee rates may reduce students' motivation to attend school and further lead to higher student absentee rates. Together, these factors suggest that the student absentee equation can be specified as

$$(2) \qquad S_i = F^B(T_i, D_{Bi}, A_i) + \epsilon_{Bi}$$

where the vector D_{Bi} includes all the district-wide variables noted above (student age distribution, school district size, sociodemographic and economic variables) that have been postulated to influence student absenteeism and ϵ_{Bi} is a random error term.

C. Student Test Scores

Our final concern is with how student absenteeism and teacher absenteeism in a school district affect student academic performance (P_i) in the district. To estimate these relationships one must control for characteristics of teachers (e.g., education, experience), characteristics of the school systems (e.g., class size, expenditure per pupil) and characteristics of the community (e.g., parental income and education levels, racial and ethnic mix) that one might expect to influence educational achievement. Denoting these latter three types of district variables by D_{Ci}, this leads to specifications of student performance equations of the form

(3) $$P_i = F^C(D_{Ci}, A_i, S_i) + \epsilon_{Ci}$$

where ϵ_{Ci} is a random error term.[9]

In the analyses that follow various measures of student performance will be used. In addition, since student absenteeism and teacher absenteeism are specified to influence each other (equations (1) and (2)) tests for whether they should be considered endogenous in each other's equation will be conducted.

III. The Data

One reason that few studies on the determinants and effects of teacher absenteeism have been conducted is that data on teacher absenteeism and contract provisions governing school district leave policies are not systematically collected and reported. To analyze these issues required us to undertake a major data collection effort.

A survey was sent to the superintendents of all 722 public school districts in New York State (excluding New York City) in October of 1987 requesting information on a number of variables including teacher usage of leave days during the 1986-87 academic year. Two follow-up surveys were sent to nonrespondents in January and April of 1988. In total 419 districts, or nearly 60% of the school districts in the state, responded to the survey.

The survey asked respondents to include in usage of leave days "sick leave and other leave days (e.g., family leave, personal leave, religious, conference and/or visitation days) taken by teachers during the academic year". The 381 districts that reported this information reported that, on average, teachers in each district used 8.9 leave days per teacher in 1986-87, with the standard deviation of mean usage across districts being 3.3 days.[10] Given a school year of about 180 days, the absentee rate of teachers in the state was slightly less than 5% in 1986-87. While this number is somewhat higher than absence rates found in May 1985 Current Population Survey data, it must be stressed that the rate for teachers includes all of the nonsick leave forms of absences enumerated above.[11] Simple tabulations also suggest that mean usage of leave days per teacher increases with school district size; private sector studies have also observed that absenteeism increases with establishment size.[12]

Data on leave provisions specified in New York State teachers' contracts in 1986-87 were compiled from contracts that over 100 of the superintendents returned with their surveys, from special reports prepared for the authors by F.A.C.T.S. (a Palmyra, New York firm that maintains files on teacher contracts) and from teacher contracts that are on file at the Albany offices of the New York State Public Employment Relations Board (PERB). From these sources, contract information for 545 school districts in the state, including virtually all districts who responded to our survey, was compiled.

These contracts indicate that provisions governing teacher leave vary widely in the state. Total leave days available per teacher each year was coded as the sum of sick leave, personal leave, family illness leave, religious leave, and bereavement leave (the latter included <u>only</u> when days used for it were deducted from the days provided in another of the categories' days). While the modal contract permitted 15 days total leave per year, others permitted between 9 and 37 days per year. Of the contracts that included a separate bereavement leave category, most frequently they provided for the availability of 3 to 5 days of leave in the event of a death of a close family member.

While most frequently contracts permitted between 180 and 200 days of unused sick leave to cumulate, about 10% of the contracts specified less than 180 days (or did not mention cumulation), while over 10% permitted more than 200 days. Over two-thirds of the contracts allowed at least part of unused accumulated sick leave to be "cashed in" at retirement (or sometimes before) either in the form of cash payments, terminal year salary increases, or the funding of health insurance after retirement. The dollar amount "paid" for day of unused leave varied widely across districts and, within a district, often varied with a retiree's age.[13] In some districts all retirees were eligible, while in others, only people retiring by specified ages were eligible to cash in unused sick leave days.

Over two-thirds of teacher contracts specified teacher eligibility for a fixed number of visitation, conference and/or professional days, with 3 or 5 days per teacher per year specified most frequently. The other one-third either did not mention such days, or indicated that they were allocated at the discretion of school administrators. Finally, almost 60% of the contracts indicated that some form of sick leave bank was present in the district.

The other data used in the analyses all came from New York State Education Department (NYE) or U.S. Bureau of Census sources. The NYE 1986-87 Personnel Master File contained the age, sex, degrees, teaching experience, tenure status, class size, and class "quality" for every assignment for every public school teacher employed in the state in the spring of 1987. This enabled us to construct district-wide averages for these variables. Data on sociodemographic characteristics of students in the district and the communities in which they reside came from the NYE 1986-87 Basic Educational Data System File and the 1980 Census of Population School District File. Data on student absenteeism were obtained from NYE Annual Education Summary: Nineteen Eighty-Six - Eighty-Seven.

The only standardized tests that all students in New York State take are third and sixth grade standardized reading and math tests (PEP tests), a sixth grade social studies test (PET) and eighth or ninth grade competency tests in reading and writing (PCT). High school students going for Regents diplomas also take various high school Regents academic examinations (REGENTS), while other high school students take Regents competency examinations (RCT). Data on the percentage of students who passed each of these tests were obtained from the NYE 1987 Comprehensive Assessment Report.

A limitation of these test score data is that they permit us to look only at the academic performance of students in the lower-tail of the academic talent distribution in each district. That is, together with the prior mentioned data, they permit us to study how teacher and student absenteeism affect pass rates (and hence failure rates) but not how teacher and student absenteeism affect scores of students who perform well above the passing level. While this is a limitation, one may plausibly argue that the lower tail of the academic talent distribution is the group whose academic performance will suffer the most from teacher and student absences.

A complete enumeration of all of the variables used in the analyses that follow and their sources are found in Appendix B.

IV. Empirical Analyses

This section presents our econometric analyses of the determinants of teacher and student absenteeism in New York State school districts in 1986-87 and of the effects of these variables on students' test score performance. Teacher and student absenteeism are each first analyzed treating the other as exogenous and then consideration is given to whether they should be treated as jointly endogenous. Finally, their effects on students' test score performance are estimated.

A) <u>Determinants of Teacher Absenteeism</u>

Table 1 presents estimates of teacher absenteeism equations for the subset of responding districts in our sample whose teacher contracts had provisions for "buy back" at the retirement date of unused cumulative sick leave days, the formula for computing the buy back was explicit and a stated maximum number of days that could be bought back was present. The dependent variable in each of these equations is the average number of leave days used by teachers in a district in 1986-87. The equation in column (1) specifies that teacher absenteeism depends only on the leave provisions found in the contract. These include the annual number of leave days permitted (nleave), whether a sick leave bank is present (bank), the number of days of bereavement leave permitted for one family member (ber), the maximum dollar per day buyout of unused cumulative leave days at retirement (buydd), the maximum number of days to which unused leave can cumulate (cum), and the annual number of visitation, professional and conference days specified in the contract (vis).[14]

Although our primary interest is in the effects of these variables, succeeding columns generalize the specification to allow for the effects of other variables. These include district size, as measured by the number of teachers in the district (ne); the average number of days students in the district were absent in 1986-87 (stuabs); three variables measuring teacher characteristics, the proportions of male teachers (pmaled), teachers age 55 and older (page55d), and tenured teachers (ptend) in the district; and two variables measuring demographic characteristics of the district; the proportions of students in the district in 1980 that resided in an urban area (purban) and that were white (pwhite). To correct for heteroscedascity of the residuals, all observations are weighted by district size.

Quite strikingly, the leave policy variables all significantly influence teacher usage of leave days and the magnitudes of their effects are relatively insensitive to the other variables included in the analyses. As expected, the larger the number of annual leave days permitted the higher annual leave usage is, although the marginal effect is significantly lower than unity. Districts that have sick leave banks average approximately one day per year more leave usage than other districts and districts that explicitly provide for bereavement leave, but do not deduct usage of such from other leave categories, also experience higher leave usage.

The presence of more generous provisions for the buy-back of unused sick leave days does lead to lower annual usage of leave days. On the one hand, increasing the number of days that unused days can cumulate to by 30 would decrease annual usage of sick leave by about one day. On the other hand, increasing the dollar per day buyout by $50 would decrease annual usage by slightly more than one-half a day a year.[15] We return below to a discussion of the wisdom of such changes.

Districts that provide for an explicit numbers of days for annual visitation, conference, and professional days are seen to have lower teacher usage of actual leave days. Since superintendents were instructed in our survey to include visitation, conference and professional days in total leave days used, this result may appear to some as counterintuitive.[16] One plausible explanation, however, is that the provision of such days (and the treatment of teachers more generally as professionals) reduces by a greater amount the number of sick leave days that teachers feel they need use for what is popularly called "rest and recuperation" purposes.

Briefly turning to the other findings, higher student absenteeism is associated with higher teacher absenteeism. Contrary to our priors, the greater the proportion of teachers older than 55, the lower the usage of sick leave, perhaps because the payoff for unused sick days will be received by older teachers in the near future. There is also some evidence here that tenured teachers have higher usage of sick leave days than nontenured teachers; a perhaps unintended side effect of the tenure system.

Tables 2 and 3 generalize the equations estimated in Table 1 to permit us to analyze data from larger samples of school districts. In Table 2 we drop the restriction that there must be a maximum stated number of days to which unused leave can cumulate and include a dummy variable if unlimited accumulation of leave is permitted (dcl). Districts which allow for unlimited accumulation are seen to have somewhat lower annual usage of sick leave than other districts.[17]

In Table 3, the further restriction is dropped that districts must have buy-back provisions at retirement whose formulae we explicitly know. The sample now used includes districts without buy-back provisions, districts with provisions for buy-back at retirement whose formulae we don't know, and districts that provide for another form of buyout of unused leave days (typically prior to retirement). As such, the specifications in this table also include a dichotomous variable that takes on the value of one if the buyout formula is not known to us or if there is another form of buyout for unused leave days and zero otherwise (buy4). Furthermore, since the affect of the number of unused days teachers may accumulate likely depends on whether a buyout provision exists, the coefficient of this variable is allowed to vary with whether a buyout provision exists (CUM1 - provision, CUM0 - no provision), as is the coefficient of the dummy variable for districts that permit unlimited accumulation of unused leave days (dcl1 - provision, dcl0 - no provision).[18]

Due to severe collinearity problems among the latter four variables, no significant effects for them are found in this table. Otherwise, the pattern of coefficients of the leave policy variables is similar to, although somewhat smaller and less significant, than those found in the preceding tables. The large negative and significant coefficient for buy4 provides additional support for the notion that provisions for buybacks of unused sick leave days reduce teacher usage of sick leave.

One final extension warrants being briefly reported here. Superintendents were asked in our survey if a retirement incentive program existed in their district and this was included as a dichotomous variable in preliminary specifications. However, this variable never proved to be significant. This result was not unexpected for two reasons. First, superintendents who responded to our survey reported that even in districts with such programs, on average, less than 2% of their teachers retired in 1986-87. Even if retirees substantially increased their absenteeism in response to a retirement incentive program, the effect on the district-wide average absentee rate would probable be too small to estimate. Second, many of the districts may well have considered their buy back provisions as a retirement incentive program and variables to capture these provisions were already included in the analyses.

B. Determinants of Student Absenteeism

Table 4 presents estimates of equations that seek to explain average absence days per student in New York State school districts in 1986-87. Student absenteeism is postulated to vary with characteristics of the district's teachers (the proportion that is male (pmaled), the proportion that has tenure (ptend), the proportion that is 55 or older (page55d)), sociodemographic characteristics of residents of the school district (median household income (mhi79), proportion of adults with at least some college education (pc), percent residing in urban areas (purban), and percent that is white (pwhite)), characteristics of the school district (proportion of students in elementary grades (felem), expenditures per pupil (exppup), and total student enrollment (te67)), and the average number of leave days used per teacher in 1986-87 (ne)). Separate estimates are presented for the entire sample and for the subsamples of school districts used in Tables 1 and 2. To correct for heteroscedascity, each district's observation is weighted by total student enrollment in the district.

Focusing initially on the specifications that treat teacher absenteeism as exogenous (the columns denoted WLS), a fairly consistent pattern of results emerges from these weighted least squares estimates. Ceteris paribus, higher teacher absenteeism is associated with higher student absenteeism, although the relationship is significantly less than one-to-one. Similarly, larger districts and districts with a higher proportion of teachers older than age 55 have higher student absentee rates. In contrast, ceteris paribus, increases in the proportions of students in elementary grades, male teachers, tenured teachers, and residents that are white all are associated with lower absentee rates, as are increases in household incomes in the community.

C. Should Teacher and Student Absenteeism be Treated as Jointly Determined?

The estimates discussed above treat student absenteeism as exogenous in the teacher absenteeism equation and teacher absenteeism as exogenous in the student absenteeism equation. The structure of these equations suggests that they may well be jointly determined and consequently weighted two-stage least squares estimates (2SLS) of the student and teacher absenteeism equations appear in Tables 4 and 5 respectively.[19] Two striking results emerge from these tables.

On the one hand, student and teacher absenteeism no longer appear to significantly influence each other; the relevant coefficients decline both in their magnitudes and their statistical significance. On the other hand, allowing each to be treated as endogenous in the other's equation does not appear to affect any of the other coefficients in the model. Most important, given our focus on the affects of school district leave policies on teacher usage of leave days, the effects of leave policies are invariant to whether student absenteeism is treated as endogenous in the teacher absenteeism equation.

Of course, one can, in fact, conduct formal specification tests to test the hypotheses that student absenteeism should be considered endogenous in the teacher absenteeism equation and visa versa.[20] These tests, which are omitted for brevity, suggest that one can reject the hypothesis that teacher usage of leave days is endogenous in the student absentee day usage equation for all three samples used in Table 4 and that one can similarly reject the hypothesis that student absentee day usage is endogenous in the teacher usage of leave days equation for all but the Table 1 sample.

Recall that teacher usage of sick leave days may appear to positively affect student usage of absentee days for two reasons. On the one hand, there is the "behavioral explanation" that increased teacher absences from the classroom may reduce students' motivation to attend school and thus increase students' absentee rates. On the other hand, there is the possibility that an omitted district-specific variable (e.g., incidence of illness) simultaneously causes both teacher and student absenteeism to be high in a district. The latter explanation, however, is <u>not</u> consistent with our rejection of the hypothesis that teacher usage of leave days should be considered endogenous in the student absentee days usage equation.

Taken together, these findings suggest that one should place more confidence in the estimates in Table 4 that treat teacher leave usage as exogenous, that teacher usage of leave days is consequently positively associated with student usage of absentee days and that the "behavioral explanation" for this association is the correct one. Our discussion in the concluding section of the paper of the benefits of reducing teacher usage of leave days will make use of these results.

D. Do Teacher and Student Absenteeism Influence Student Test Score Performance?

Table 6 presents estimates of the determinants of the percentages of students that passed various standardized tests in New York State school districts in 1986-87. Pass rates are specified in these equations to be functions of vectors of characteristics of teachers in the district, characteristics of classes in the district, characteristics of the racial, ethnic and income distributions of students in the district, and of the average number of days that students in the district were absent during the year.

The estimates suggest that, ceteris paribus, teachers with less than a master's degree (PLMAST) are associated with lower and those with more than a master's degree (PGTMAST) higher, student achievement. Pass rates also tend to be consistently (across tests) lower in districts with higher percentages of black students (BLKP), hispanic students (HISP) and students from low-income families (SOCIN). Student absenteeism also appears to be important; for every three additional days students on average are absent, the percentage of students who pass the various tests falls by about 1.0 to 2.5 percentage points.[21] This should be contrasted with mean pass rates on the various tests that range from 82 to 93%.[22,23]

Teacher usage of leave days data were available for only about 55% of the districts. To estimate the effect of teacher absenteeism on student test score performance, the equations in Table 6 were reestimating adding teacher leave day usage to the equations, assigning this variable a value of zero if it was not reported, and then adding a (1,0) nonreporting of teacher leave usage variable to the equation.[24] This was done separately for the average number of leave days used by teachers in the district variable and, for tests taken in the elementary and secondary grades respectively, for estimates of the average number of leave days used by elementary and secondary teachers in the district respectively.[25]

The inclusion of these teacher absentee variables had virtually no effect on the coefficients of the other variables in the model. Estimates of the coefficients for the teacher and student absences variables are presented in Table 7. Quite strikingly, for only one of these standardized tests, the preliminary competency test (PCT) taken in the eighth or ninth grades, is there any evidence that teacher absenteeism adversely affects student test score performance. The estimates imply that if teacher absenteeism in a district could be reduced by five days per year, pass rate on the PCT in the district would rise by about .75 to .85 percentage points.[26] We stress, however, that these results suggest that teacher absenteeism does not influence student performance on any of the other elementary and secondary school standardized tests.

Several extensions of these analyses warrant briefly being reported here.[27] First one may argue that the purpose of providing teachers with conference, visitation, and professional days is to increase their effectiveness in the classroom. Thus including these days in total leave days used, as we have done, may confound the effects of other types of leave days on student test score performance. While our data do not permit us to separate out conference, visitation, and professional days actually used by teachers in each district, we do know for many districts the number of such days specified in union contracts that teachers may take (vis). Reestimation of the equations in Table 7 with this variable included as an additional explanatory variable did not cause the coefficients of teacher usage of leave days to increase in size or significance, nor were the coefficients of this variable systematically either positively (or negatively) associated with student test score performance.

Second, one may argue that the positive partial correlations we observe between student absenteeism and student test score performance arise because students doing poorly in school tend to be those who are less motivated and thus absent more, not because student absenteeism leads to poorer test score performance. To test for this, we reestimated the test score equations in Table 6 and the student absentee equation in Table 4, adding the vector of test scores as additional explanatory variables in the student absentee equation and treating the test scores and student absentee rate as being simultaneously determined.

On average, treating student absenteeism as endogenous in the student test score equations did not lead to smaller estimates of the effects of student absenteeism on student test score performance. Furthermore, including student test score performance in the student absentee equation only marginally reduced the effect of teacher usage of leave days on student absenteeism.[28]

V. Conclusions

Two principal sets of findings have emerged from our analyses. First, school district policies governing the annual usage of teacher leave days that appear in teacher contracts clearly do influence teachers' usage of leave days. Ceteris paribus, a larger annual number of leave days permitted, the presence of a "sick leave bank", a larger number of days granted for bereavement leave, and a smaller number of professional, visitation and conference days specified in the contract, are all associated with higher actual teacher usage of leave days. Similarly, policies that govern the "buyback" of unused sick days clearly matter. In districts in which cumulated unused sick leave days can be "bought back", typically at retirement, increases in the number of days that can be "cashed-in" or in the dollars per day buyout are both associated, ceteris paribus, with lower leave usage.

Second, higher student absenteeism is associated with lower pass rates (higher failure rates) for students on a set of standardized tests. In contrast, teacher absence from the classroom, at least at the levels currently observed in New York State, for the most part does not appear to be associated with students' pass rates on these tests.

Of course one should not conclude from this last statement that teacher absenteeism has no impact on student learning. As already discussed, our analyses focuses on pass rates on a set of standardized tests; they thus do not permit one to conclude anything about how teacher usage of leave days affects students whose academic performance is well-above the "minimum pass" level on the exams nor how it affects aspects of learning not measured by them. Moreover, one might reasonably suspect that the variable measured with the greatest error in our analyses was the teacher usage of leave day variable, as all other variables came from annual reports filed by school districts with New York State, census data, or union contracts. As is well known, if the measurement error in the teacher absenteeism variable is random, this will cause its estimated effect on student test score performance to be biased towards zero.[29]

Taking these latter results at face value, however, one can use our findings to indicate the components that would go into a benefit/cost analysis of the wisdom of changing the various provisions governing teacher leave found in teacher contracts. For example, suppose one wanted to increase the dollar per day buyout for unused leave by $50. Our estimates (Table 1) suggest this would reduce teachers usage of sick leave by more than one-half a day per teacher per year.

Now the benefits of such a reduction would take several forms. First, districts would incur lower costs for substitute teachers; the savings here would depend on the salaries they pay for substitutes, as well as on the extent to which lower teacher absenteeism would lead districts to reduce their usage of substitutes.[30] Second, to the extent that lower teacher absenteeism behaviorally leads to lower student absenteeism, as our discussion in section IV.C suggests, districts would benefit financially because state aid to education formulae in New York are based on school districts' average daily attendance.[31] Third, to the extent that lower student absenteeism leads to higher student test score performance, as the results in Table 6 suggest, student test scores would increase and the districts should place some value on this outcome.

The costs of such a reduction would be the higher payments for unused sick days that districts would be obligated to make when teachers retire. These payments would increase both because the dollar per day payment had increased and because the number of leave days teachers use had decreased. Of course, not all teacher in a district actually remain in a district until their retirement date and, to the extent that these buybacks have minimum age requirements (they typically apply only if one leaves the district at age 55 or later), the buybacks may not be as expensive as crude estimates might suggest.

Footnotes

1. Eric Hanushek's (1986) survey of the educational production function literature never mentions teacher absenteeism. Richard Murnane (1976) did find that student absenteeism adversely affected math test scores in his sample of inner city children. Ann Summers and Barbara Wolfe (1977) similarly find student absenteeism to negatively impact on test scores, however other studies such as Lynn M. O'Brien, Bonnie Meszaros, and William Pulliam (1985) and Robert Ziomek and William Schoenberger (1983), do not find such a relationship. Studies of the affects of the weekly time teachers spend on instruction on test scores include Byron Brown and Dan Saks (1984), H.J. Kiesling (1984), and Charle Link and James Mulligan (1986).

2. Studies by economists, that treat absenteeism as a choice-variable in "labor-leisure" or "compensating differential for unfavorable job characteristic" frameworks, include Steven Allen (1981a) (1981b) (1983) (1984), and James Chelius (1981). Research by industrial psychologists and management specialists on absenteeism is critically reviewed in Paul Goodman, et al. (1984). The few studies on the relationship between absenteeism and sick leave policies include Dan Dalton and James Perry (1981), Paul Edwards and Hugh Scullion (1979), Barron Harvey, Jerome Rogers, and Judy Schultze (1983), Richard Kopelman, George Schneller and John Silver (1981), and William Woska (1972); in the main these are case studies or simple correlational analyses based on a small number of employers.

3. Donald Winkler (1980).

4. Stephen Jacobson (1989).

5. In some districts teachers receive end of year cash bonuses if their sick leave usage falls below prescribed levels.

6. See, for example, Allen (1981b) and Chelius (1981).

7. Most long-term disability plans have six month waiting periods and thus offer only limited earnings protection against long (but temporary) illnesses).

8. If the plans do succeed in reducing the average age of teachers in the district, in subsequent years, ceteris paribus, absentee rates may be lower.

9. Ehrenberg, Chaykowski, and Ehrenberg (1988) have estimated school district test score performance equations using earlier years data for New York State than are used here. Their analyses, however, only used a subset of the educational performance and district-wide measures used in this paper and did not include measures of teacher or student absenteeism.

10. Respondents who did not report usage of sick leave either chose not to participate in the study or claimed they lacked the resources to compute sick leave usage for us.

11. See Bruce Klein (1986). While nationally 4.7% of all workers were absent sometime during the survey week, the proportion of weekly hours lost due to absenteeism (which corresponds to our absentee rate) was 2.6%.

12. See "BNA's Job Absence and Turnover Report" (1988).

13. The credit received for unused day is sometimes specified as a dollar amount, sometimes as a percentage of the individual's salary and, still other times, as a percentage of the district's starting or average teacher salary.

14. BUYDD was calculated as follows. If the formula was specified as a fixed dollar amount per day, this amount was used. In cases where the amount varied (typically inversely) with age at retirement, the largest fixed dollar amount was used. If the formula was specified as a fixed percentage of either a teacher's final salary or of the average salary in the district, this percentage was applied to the average teacher salary in the district that we computed from individual teacher salary data found in the NYE 1986-87 Personnel Master File. Again, in cases where the percentage varied with age at retirement, the largest percentage permitted was used.

15. To judge the magnitude of such an increase, the mean value of buydd in this sample was $48.53 dollars/day and the standard deviation was $48.12. Actual values ranged from $5.00 to $228.56 per day across districts.

16. See section III.

17. The mean level of CUM in districts with a specified maximum limit was about 200 in this sample. The product of 200 and -.03 is -6.00 which is slightly lower (in absolute value) than the -6.6 coefficient of dcl in column (5).

18. See section II.

19. For comparison purposes, WLS estimates of the teacher absenteeism equations are also reproduced in Table 5.

20. To test whether teacher usage of leave days should be considered exogenous in the student absentee day usage equation, for example, one reestimates the student absentee day equation including both teacher usage of leave days and an instrument for teacher usage of leave days in the

equation. If the former's coefficient proves to be statistically significantly different from zero but the latter's does not, one can reject the hypothesis that teacher usage of leave days is endogenous in the student absentee equation. See J. A. Hausman (1978) for details.

21. The mean number of days students were absent in each district was about 10, while the standard deviation of mean absence days across districts was around 2.5 days.

22. The PET score reported is the district's percentile rank in the state and thus is lower on average, than the other test scores.

23. One extension warrants being briefly reported. It is reasonable to assume that unobserved district specific factors will cause the residuals for a district to be correlated across equations in Table 6. Efficiency can be improved in such a case by estimating the equations as a system of "seemingly unrelated regressions" over the set of districts for which data on all test scores were available. When this was done, using a smaller sample of 610 districts, virtually identical results to those in Table 6 were found.

24. This is known as the "modified zero-order regression" method for regression analyses with missing data. See Maddala (1977).

25. About 250 school districts reported leave days used by secondary school teachers in their survey responses as well as total teacher leave day usage. For these districts we were thus able to estimate elementary teacher usage of leave days.

26. Across districts in the sample, the mean pass rate on the PCT was close to 93% and the standard deviation was 6%.

27. These results are available from the authors.

28. The .086 coefficient of ne in column 4 of Table 1 fell to .075 when the student test score performance variables were included and the latter treated either as exogenous or endogenous.

29. See Maddala (1977) or any other econometrics text. Strictly speaking, the direction of the bias can be signed only if all other explanatory variables in the model are measured without error. Random measurement error in dependent variables leads to inefficient but unbiased estimates so our estimated coefficients in the teacher usage of sick leave equations remain unbiased.

30. Salary data for substitute teachers are typically not found in teacher contracts, as in most districts substitute teachers are not part of the teacher bargaining unit. Special tabulations made by the Division of Research and Educational Services of the New York State United Teachers for four downstate counties (Suffolk, Putnam, Westchester, and Rockland) suggest that starting salaries for certified per diem substitutes typically were in the $40 to $65 per day range.

Our survey also asked school districts to report their usage of substitute teachers and approximately 350 reported this along with teacher usage of leave days. While on average, the two numbers were quite close one-quarter of the districts reported that they used 15% or more substitute days than teachers' used leave days. Similarly, another quarter reported that they used 11% or less substitute days than teachers' used leave days. Thus, decreases in teacher usage of leave days do not lead necessarily to equal decreases in the use of substitute days.

31. The specification tests described in the text imply that the estimates in Table 4 that treat teacher leave usage as exogenous (the ones labelled WLS) are the ones too focus on. They suggest that each additional day of teacher absenteeism increases student absenteeism on average by about .1 days. Hence, if increasing the buyback at retirement for unused leave days by $50 would reduce teacher leave usage by .5 days per teacher, it would decrease average student usage of sick leave days by .05 days. Based on a 180 day school year, this would increase average daily attendance in the district by .028%.

Now in 1986-87, per-pupil state aid to education averaged $2,754 in districts outside New York State (Office of the New York State Controller, 1987). Assuming a mean class size of 25 students per teacher, the average increase in state aid per teacher that would result would be (.028/100)(2754)(25) or slightly over $19.

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Appendix A

A Simple Model of Absenteeism

Consider the following simple model of absenteeism that abstracts from many of the complexities discussed in the text. Let L be the maximum annual number of days of leave teachers are eligible for each year. Let S(<L) be the annual number of sick leave days they must use each year due to illness; this is assumed to be known with certainty and too be constant over their work life.

Let A be the number of leave days that teachers use each year and assume that they are allowed to "save" each year's unused sick leave days for potential use in the future. Any cumulated unused sick leave that is unused as of their retirement date is "bought back" from them by the school district at a rate of $6 per unused day.

To further simplify ignore discounting and assume that teachers get utility from the sum over their worklives of leave days that they use each period that are not required due to illness and from the payments (Y) they receive at retirement for unused leave days. That is, assume that they have a quasi-concave utility function (U) of the form

(A1) $u = u(n(A-S),Y)$

$u_1, u_2 > 0,$

where n is the number of periods they plan to work until retirement and

(A2) $Y = bn(L-A)$

Teachers seek to choose values of A to maximize

$$L = u(n(A-S),Y) + \lambda\,(bn(L-A)-Y).$$

where λ is a lagrangian multiplier. The first order conditions for a maximization require that

(A4a) $nu_1 - \lambda bn = 0$

(A4b) $u_2 - \lambda = 0$

(A4c) $bn(L-A)-Y = 0$

From (A4a) and (A4b) it immediately follows that $\lambda > 0$ and that in equilibrium $b = (u_1/u_2) > 0$.

Totally diffrentiating the first order conditions and writing the results in matrix notation, one obtains

$$\text{(A5)}\quad \begin{bmatrix} n^2u_{11} & nu_{12} & -bn \\ nu_{21} & u_{22} & -1 \\ -bn & -1 & 0 \end{bmatrix} \begin{bmatrix} dA \\ dY \\ d\lambda \end{bmatrix} = \begin{bmatrix} \lambda n & 0 & \lambda b-u_1 \\ 0 & 0 & 0 \\ (A-L)n & -bn & (A-L)b \end{bmatrix} \begin{bmatrix} db \\ dL \\ dn \end{bmatrix}$$

Let D denote the determinant of the 3 by 3 matrix on the left-hand side of (A5). Second order conditions for the solution to the optimization problem to be a maximum guarantee that $D > 0$.

Comparative static results can be obtained by solving (A5) using Cramer's Rule. It is straightforward to show (making use of the first order condition result that $b = u_1/u_2$) that

(A6) $\partial A/\partial L = (bn^2/u_2D)(u_{12}u_2 - u_1u_{22})$ and

(A7) $\partial Y/\partial L = (b^2n^3/u_1D)(u_{12}u_1 - u_2u_{11})$

If the usage of leave days and the payments at retirement for unused leave days are both normal goods then

$$u_{12}u_2 - u_1u_{22} > 0 \text{ and } u_{12}u_1 - u_2u_{11} > 0.$$

Thus, an increase in the number of leave days teachers are eligible for each year will increase both their annual usage of leave days and the payments they receive for unused leave days

(A8) $\partial A/\partial L > 0 \qquad \partial y/\partial L > 0$

Taken together, this implies that an increase in the number of leave days teachers are eligible for each year will lead to a smaller increase in the number of leave days used each year since part of this increase in "wealth" is used to "purchase" increased income at retirement.

(A9) $0 < \partial A/\partial L < 1$.

It is similarly straightforward to show that

(A10) $\partial A/\partial b = (-\lambda n/D) + ((L)/b)(\partial A/\partial L)$.

Unambiguous predictions about the effect of an increase in the size of the payment at retirement for unused sick leave days can not be obtained. The first term in (A10), which represents the substitution effect, is always negative. However, the second term in (A10), which represents the income effect of the change in the "price" of unused days is positive.

Finally, it is also straightforward to show that

$$\text{(A11)} \quad \partial A/\partial n = ((L-A))/n)(\partial A/\partial n) > 0.$$

Teachers with longer horizons (those farthest from retirement at the date of hire) will use more days of leave per year.

We must stress that this model abstracts from many important complexities. These include a varying incidence of the number of sick days that must be used each year over the life cycle and the uncertainty associated with these days, varying preferences for usage of leave days over the life cycle, positive rates of discount, an upper limit on the number of leave days that may be cumulated, and allowing the usage of leave days to vary over the life cycle. Nonetheless, the model clearly illustrates how leave policies may influence absenteeism.

Appendix B

Sources of Data

A) From Authors' Survey of School Superintendents in New York State (all data refer to the 1986-87 academic year)

- NE - Number of teachers in the district
- INC - 1-presence of a retirement incentive plan, 0-no
- LNE - Leave days used per teacher in the district
- RNE - Retirement rate of teachers in the district

B) From FACTS, contracts provided by the superintendents, and contracts on file at PERB in Albany (all data refer to the 1986-87 academic year)

- NLEAVE - Annual leave days (including bereavement leave if part of another category), 0-missing or unlimited
- CUM - Days that unused leave can cumulate to, 0-not reported or unlimited
- DC1 - 1-cumulative leave days unlimited, 0-other
- BANK - 1-sick leave bank present, 0-no
- BER - Days of bereavement leave for one family member if bereavement leave is a separate category, 0-other
- BUYDD - Estimate of maximum $/day buyout at retirement, 0-no buyout or another form of buyout
- BUY4 - 1-buyout takes a different form, and/or additional buyout provisions are present, 0-either a $/day or % salary/day form is used or no buyout provision is present
- VIS - Annual visitation, professional, and conference days specified in the contract

C) From the 1986-87 New York State Education Department Personnel Master File (when E or S replaces D, variable is for elementary or secondary grade teachers in the district).

- MSALARYD (E,S) - mean salary of teachers in the district
- PMALED (E,S) - percent of male teachers in the district
- PLTMASTD (E,S) - percent of district's teachers with less than a master's degree
- PGTMASTD (E,S) - percent of district's teachers with more than a master's degree
- PINDLYD (E,S) - percent of district's teachers who taught in the district last year
- PTEND (E,S) - percent teachers with tenure in the district
- MEXP3D (E,S) - mean years total teaching experience for district's teachers
- PAGE55D (E,S) - percent of teachers age 55 and older in the district
- MASSEXPD (E,S) - mean years experience for the district's teachers in the particular assignment
- MSIZED (E,S) - mean class size in the district

PMIXD (E,S) - percent of the district's classes that are of mixed skill level

MHOMOOD (E,S) - mean quality in homogeneous classes in the district (1=below average, 2=average, 3=above average, 4=honors, 5=advanced placement)

D) From the 1986-87 New York State Education Department BEDS (Basic Educational Data System) file.

TE67 - total district enrollment
INDP67 - percentage of students that are American Indian
BLKP67 - percentage of students that are black
HISP67 - percentage of students that are Hispanic
LIMEP67 - percentage of students with limited English proficiency
SOCIN67 - socioeconomic indicator for the district (percentage of children age 5 to 17 in families below the poverty line)

E) From the 1987 New York State Education Department Comprehensive Assessment Report data file.

PEP3 - percent of districts 3rd grade students above the SRP on the PEP tests

PEP6 - percent of district's 6th grade students above the SRP on the PEP tests

PEPALL - percent of district's 3rd and 6th grade students above the SRP on the PEP tests

PET - percentile rank of the district's students on the grade six social studies PET test

PCT - percent of district's students taking PCT reading and writing tests that passed

RCT - percentage of students who took regents competency tests who passed them

REGENTS - percentage of students who took regents exams who passed them

FELEMTE - fraction of district's enrollment in elementary grades

F) From Annual Educational Summary Nineteen Eighty-Six-Eighty-Seven (State Education Department)

STUABS - Average number of days students were absent from school
EXPPUP - Expenditures per pupil in the district

G) From 1980 Census of Population: School District File (all data refer to 1979)

MHI79 - Median household income
PURBAN - Percent urban
PWHITE - Percent white
PHHWC - Percent households with children
PC - Percent adults with at least some college education

Table 1

Determinants of Teacher Usage of Leave Days in New York State in 1986-87: Sample of School Districts With "Buy-Back" Provisions and Stated Maximum Number of Days That Can Be Bought Back (absolute value t statistics)

	(1)	(2)	(3)	(4)	(5)
Constant	11.560 (5.5)	11.254 (5.7)	9.987 (4.4)	3.480 (1.0)	-.626 (0.1)
nleave	.179 (2.9)	.145 (2.5)	.140 (2.4)	.124 (2.1)	.116 (2.0)
bank	.916 (2.0)	1.000 (2.3)	1.001 (2.4)	.834 (2.0)	1.021 (2.4)
ber	.344 (3.2)	.233 (2.2)	.233 (2.2)	.204 (2.0)	.182 (1.8)
buydd	-.007 (1.8)	-.011 (2.8)	-.010 (2.5)	-.011 (2.8)	-.013 (3.2)
cum	-.030 (3.0)	-.030 (3.2)	-.028 (3.0)	-.028 (3.0)	-.031 (3.3)
vis	-.918 (3.2)	-.729 (2.6)	-.753 (2.7)	-.761 (2.8)	-.838 (3.1)
ne		.005 (4.3)	.004 (3.2)	.004 (2.9)	.004 (2.2)
stuabs			.108 (1.2)	.185 (2.1)	.310 (2.7)
pmaled				2.194 (0.6)	2.373 (0.6)
page55d				-9.905 (2.3)	-12.659 (2.7)
ptend				8.228 (2.4)	6.531 (1.9)
purban					.958 (1.5)
pwhite					5.196 (1.8)
$\bar{R}^2$	.162	.248	.288	.296	.307
n	162	162	162	162	160

where

- nleave - annual leave days permitted per teacher in the district (includes bereavement leave if it is part of another category)
- bank - 1=sick leave bank present in the district, 0=no
- ber - days of bereavement level permitted for one family member if bereavement leave is a separate category
- buydd - maximum dollar/day buyout of unused cumulative leave days at retirement
- cum - maximum number of days to which unused leave can cumulate
- vis - annual visitation, professional and conference days specified in the contract
- ne - number of teachers in the district
- stuabs - average number of days students in the district were absent in 1986-87
- pmaled - fraction of male teachers in the district
- page55d - fraction of teachers age 55 and older in the district
- ptend - fraction of teachers with tenure in the district
- purban - fraction of students in the district residing in an urban area in 1980
- pwhite - fraction of students in the district who were white in 1980

See Appendix B for sources of data.

Table 2

Determinants of Teacher Usage of Leave Days in New York State in 1986-87: Sample of School Districts With "Buy-Back" Provisions (absolute value t statistics)

	(1)	(2)	(3)	(4)	(5)
Constant	10.818 (5.3)	10.442 (5.5)	9.131 (4.2)	3.763 (1.1)	1.482 (0.3)
nleave	.192 (3.4)	.183 (3.4)	.179 (3.4)	.172 (3.3)	.170 (3.2)
bank	1.163 (2.8)	1.059 (2.7)	1.069 (2.7)	.876 (2.3)	1.012 (2.5)
ber	.298 (3.1)	.214 (2.3)	.201 (2.2)	.181 (2.0)	.151 (1.6)
buydd	-.005 (1.5)	.010 (2.7)	-.009 (2.5)	-.010 (2.7)	-.011 (3.0)
cum	-.028 (2.9)	-.030 (3.3)	-.027 (3.0)	-.029 (3.1)	-.031 (3.3)
dcl	-5.317 (2.8)	-6.036 (3.3)	-5.553 (3.0)	-6.078 (3.3)	-6.559 (3.4)
vis	-.714 (2.8)	-.539 (2.2)	-.561 (2.3)	-.561 (2.4)	-.592 (2.5)
ne		.005 (4.8)	.004 (3.9)	.004 (3.6)	.004 (3.0)
stuabs			.102 (1.3)	.180 (2.3)	.247 (2.7)
pmaled				3.140 (0.9)	3.548 (1.0)
page55d				-10.400 (2.6)	-12.527 (2.8)
ptend				6.541 (2.1)	4.949 (1.5)
purban					.798 (1.3)
pwhite					3.301 (1.2)
$\bar{R}^2$	.152	.244	.247	.286	.288
n	190	190	190	190	188

where

cum - maximum number of days to which unused leave can cumulate, equals 0 if unlimited

dcl - 1=unlimited accumulation of unused leave days, 0=limited accumulation

All other variables are defined as in Table 1.

Table 3

Determinants of Teacher Usage of Leave Days
in New York State in 1986-87
(absolute value t statistics)

	(1)	(2)	(3)	(4)	(5)
Constant	7.582 (5.3)	7.039 (4.6)	5.073 (2.9)	-.699 (0.3)	.149 (0.0)
nleave	.081 (2.0)	.085 (2.1)	.080 (2.0)	.070 (1.8)	.071 (1.8)
bank	.451 (1.4)	.506 (1.6)	.479 (1.4)	.364 (1.1)	.357 (1.0)
ber	.160 (2.2)	.137 (1.8)	.119 (1.6)	.089 (1.1)	.091 (1.1)
buydd	-.005 (1.3)	-.004 (1.2)	-.004 (1.0)	-.008 (2.0)	-.007 (1.9)
buy4	-.996 (2.0)	-.985 (1.9)	-.799 (1.6)	-1.292 (2.5)	-1.315 (2.5)
cum1	.001 (0.2)	.004 (0.5)	.006 (0.8)	.004 (0.5)	.005 (0.7)
cumØ	-.003 (0.5)	-.002 (0.3)	.001 (0.1)	-.003 (0.4)	-.001 (0.2)
dcl1	.531 (0.3)	.897 (0.6)	1.332 (0.9)	.843 (0.6)	1.048 (0.7)
dclØ	-.721 (0.5	-.340 (0.2)	.269 (0.1)	-.281 (0.2)	-.038 (0.0)
vis	-.176 (0.5)	-.160 (1.1)	-.158 (1.0)	-.146 (1.0)	-.148 (1.0)
ne		.000 (1.0)	-.000 (0.7)	-.000 (0.7)	-.000 (0.6)
stuabs			.170 (2.4)	.211 (2.9)	.192 (2.1)
pmaled				2.335 (0.8)	2.320 (0.8)
page55d				-.474 (0.1)	.029 (0.0)
ptend				7.040 (3.0)	7.486 (2.9)
purban					-.213 (0.4)
pwhite					-1.211 (0.5)
$\bar{R}^2$	.039	.039	.053	.086	.081
n	331	331	331	331	328

where

buydd - maximum dollar/day buyout of unused cumulative leave days at retirement if known to us, 0=other

buy4 - 1=other form of buyout (including prior to retirement) or formula not known to us, 0=other

cum1 - =cum if buyout provision exists, =0 otherwise

cumØ - =cum if no buyout provision, =0 otherwise

dcl1 - =dcl if buyout provision exists, =0 otherwise

dclØ - =dcl if no buyout provision, =0 otherwise

All other variables are defined as in Tables 1 and 2.

Table 4

Determinants of Average Student Absentee Days in New York State School Districts in 1986-87
(absolute value t statistics)

	Entire Sample		Buy-Back Provision Subsample[a]		Restricted Buy-Back Provision Subsample[b]	
	WLS	2SLS	WLS	2SLS	WLS	2SLS
Constant	26.519 (15.6)	30.264 (14.8)	30.029 (13.1)	30.245 (13.2)	31.998 (13.8)	32.033 (13.9)
felem	-7.735 (4.8)	-8.890 (5.6)	-9.476 (5.0)	-9.042 (4.7)	-11.164 (6.1)	-10.541 (5.3)
pmaled	-3.409 (1.8)	-5.214 (2.6)	-5.801 (2.2)	-5.382 (2.0)	-5.328 (2.1)	-4.944 (1.9)
ptend	-3.683 (2.5)	-4.256 (2.4)	-2.088 (1.0)	-1.447 (0.7)	-4.617 (2.2)	-3.332 (1.5)
page55d	6.168 (2.9)	6.665 (3.1)	9.771 (3.6)	8.903 (3.0)	11.766 (4.3)	10.220 (3.4)
exppup[c]	.493 (3.4)	.209 (1.4)	.301 (1.5)	.248 (1.3)	.265 (1.2)	.241 (1.2)
mhi79[c]	-.130 (5.3)	-.112 (4.5)	-.165 (5.0)	-.175 (5.3)	-.188 (5.9)	-.199 (6.1)
pc	-2.980 (2.2)	-2.641 (1.9)	-2.061 (1.0)	-1.720 (0.8)	2.671 (1.2)	2.577 (1.1)
purban	.617 (1.9)	.791 (2.4)	.600 (1.3)	.749 (1.6)	.140 (0.3)	.257 (0.6)
pwhite	-9.876 (9.2)	-12.753 (8.5)	-12.404 (8.7)	-12.439 (8.7)	-13.088 (9.7)	-13.181 (9.8)
te67[c]	.177 (9.8)	.142 (7.5)	.169 (2.9)	.187 (2.9)	.206 (3.0)	.252 (3.1)
ℓne	.086 (2.8)	.203 (1.6)	.104 (2.3)	.026 (0.2)	.152 (3.4)	.038 (0.3)
$\bar{R}^2$	.688	.704	.660	.648	.732	.715
n	359	336	188	188	160	160

[a]Sample used in Table 2.

[b]Sample used in Table 1.

[c]Coefficient has been multiplied by 1000.

WLS - weighted least square estimates

2SLS - weighted two-stage least square estimates

where
felem - fraction of students in the district in elementary grades in 1986-87
exppup - expenditure per pupil in 1986-87
mhi79 - median household income in the school district in 1979
pc - fraction of adults in the school district with at least some college education in 1979
te67 - total student enrollment in the district in 1986-87
ℓne - average leave days used per teacher in the district in 1987-87

All other variables are defined in Table 1.
See Appendix B for data sources.

Table 5

Comparison of WLS and 2SLS Estimates of the Determinants of Teacher Usage of Leave Days
(absolute value t statistics)

	Table 1 Subsample		Table 2 Subsample		Table 3 Sample	
	WLS	2SLS	WLS	2SLS	WLS	2SLS
Constant	-.626 (0.1)	6.753 (1.1)	1.482 (0.3)	3.664 (0.6)	.149 (0.0)	5.767 (1.0)
nleave	.116 (2.0)	.131 (2.2)	.170 (3.2)	.171 (3.2)	.071 (1.8)	.075 (1.9)
bank	1.021 (2.4)	1.026 (2.3)	1.012 (2.5)	1.025 (2.5)	.357 (1.0)	.438 (1.3)
ber	.182 (1.8)	.180 (1.7)	.151 (1.6)	.159 (1.7)	.091 (1.1)	.106 (1.3)
buydd	-.013 (3.2)	-.013 (3.2)	-.011 (3.0)	-.011 (3.0)	-.007 (1.9)	-.007 (1.8)
buy4					-1.315 (2.5)	-1.421 (2.6)
cum	-.031 (3.3)	-.031 (3.1)	-.031 (3.3)	-.031 (3.2)		
cum1					.005 (0.7)	.005 (0.6)
cum∅					-.001 (0.2)	-.001 (0.2)
dc1			-6.559 (3.4)	-6.525 (3.4)		
dc11					1.048 (0.7)	1.139 (0.7)
dc1∅					-.038 (0.0)	-.095 (0.1)
vis	-.838 (3.1)	-.724 (2.5)	-.592 (2.5)	-.569 (2.3)	-.148 (1.0)	-.147 (1.0)
ne	.004 (2.2)	.005 (2.7)	.004 (3.0)	.004 (3.0)	-.000 (0.6)	.000 (0.3)
stuabs	.310 (2.7)	.005 (0.0)	.247 (2.7)	.157 (0.8)	.192 (2.1)	-.025 (0.1)
pmaled	2.373 (0.6)	3.255 (0.8)	3.548 (1.0)	3.703 (1.1)	2.320 (0.8)	2.537 (0.8)
page55d	-12.659 (2.7)	-10.763 (2.2)	-12.527 (2.8)	-11.888 (2.6)	.029 (0.0)	.600 (0.1)
ptend	6.531 (1.9)	5.769 (1.6)	4.949 (1.5)	4.775 (1.4)	7.486 (2.9)	6.835 (2.5)
purban	.958 (1.5)	.800 (1.2)	.798 *1.3)	.774 (1.3)	-.213 (0.4)	-.168 (0.3)
pwhite	5.196 (1.8)	.251 (0.0)	3.301 (1.2)	1.876 (0.5)	-1.211 (0.5)	-4.696 (1.1)
$\bar{R}^2$	.307	.271	.288	.271	.081	.067
n	160	160	188	188	328	327

See Tables 1, 2 and 3 for variable definitions.

Table 6

Determinants of the Percentages of New York State School District Students That Passed Various Standardized Tests, 1986-87 Academic Year

	PEP3	PEP6	PEPA	PET	PCT[b]	RCT	REGENTS[c]
INTERCEPT	98.358 (24.8)*	101.497 (19.6)*	100.599 (28.0)*	90.773 (28.0)*	93.233 (11.3)*	100.820 (18.5)*	61.559 (10.8)*
PMALE[a]	7.865 (2.7)*	-0.479 (0.1)	3.085 (1.1)	9.672 (0.8)	-1.585 (0.4)	.427 (0.1)	-6.745 (2.1)*
PLTMAST[a]	-2.528 (1.9)**	-5.547 (3.2)*	-4.254 (3.5)*	-13.163 (2.6)*	-3.160 (1.9)**	3.067 (1.4)	-.610 (0.3)
PGTMAST[a]	3.501 (2.0)*	.539 (0.2)	1.764 (1.1)	10.180 (1.4)	4.093 (1.9)**	-2.499 (1.0)	6.073 (2.5)*
MEXP3[a]	-.145 (0.9)	-.221 (1.0)	-.161 (1.1)	-.016 (0.0)	-.020 (0.1)	-.173 (0.7)	-.062 (0.2)
PINDLX[a]	.470 (0.1)	.653 (0.1)	-1.130 (0.3)	-6.327 (0.4)	4.236 (0.9)	2.926 (0.5)	20.487 (4.0)*
MASSEXP[a]	.056 (0.4)	.273 (1.5)	.176 (1.4)	.027 (0.0)	.066 (0.4)	-.087 (0.4)	-.045 (0.2)
MSIZE[a]	.084 (2.0)*	-.099 (1.8)**	-.004 (0.1)	-.317 (1.9)**	-.069 (1.3)	-.124 (2.2)*	.047 (0.8)
PMIX[a]	-1.229 (1.3)	.161 (0.1)	-.745 (0.8)	3.061 (0.8)	-3.111 (2.7)*	2.839 (1.7)**	-2.491 (1.5)
MHOMOG[a]	-.109 (0.1)	1.007 (1.2)	.655 (1.1)	4.923 (2.0)*	.610 (0.7)	-.102 (0.1)	5.781 (4.6)*
INDP	.105 (0.6)	-.030 (0.3)	.029 (0.5)	.069 (0.3)	.005 (0.1)	-.128 (1.4)	.098 (1.0)
BLKP	-.037 (2.1)*	-.131 (5.7)*	-.077 (4.9)*	-.316 (4.7)*	-.132 (5.8)*	-.178 (7.5)*	-.196 (8.0)*
HISP	.034 (0.5)	-.098 (1.2)	-.067 (1.2)	-.875 (3.9)*	-.126 (1.8)**	-.051 (0.6)	-.169 (2.0)*
LIMEP	-.387 (2.1)*	-.044 (0.1)	-.102 (0.7)	2.182 (3.2)*	.160 (0.7)	-.458 (1.9)**	.332 (1.3)
SOCIN	-.232 (6.8)*	-.199 (4.5)*	-.208 (6.8)*	-1.082 (8.4)*	-.170 (4.0)*	-.057 (1.2)	-.223 (4.7)*
STUABS	-.308 (3.6)*	-.526 (4.7)*	-.382 (5.0)*	-1.359 (4.2)*	-.365 (3.6)*	-.825 (7.2)*	-.421 (3.6)*
$\bar{R}^2$	.280	.324	.382	.397	.322	.445	.453
n	686	686	686	690	620	658	660

*(**) Coefficient is statistically significantly different from zero at the .05 (.10) level of significance, two-tail test.

Table 6 (continued)

where

PEP3	percentage of district's 3rd grade students who scored above the SRP on the PEP tests
PEP6	percentage of district's 6th grade students who scored above the SRP on the PEP tests
PEPA	percentage of district'a 3rd and 6th grade studens who scored above the SRP on the PEP tests
PET	percentile rank of district's students on the grade six social studies PET test
PCT	percentage of district's students taking PCT reading and writing tests that passed
RCT	percentage of district's students who took regents competency exams that passed them
REGENTS	percentage of district's studenta who took regents exams that passed them
PMALE	proportion of male teachers in the district
PLTMAST	proportion of teachers with less than a master's degree in the district
PGTMAST	proportion of teachers with more than a master's degree in the district
MEXP3	mean years total teaching experience for district's teachers.
PINDLY	proportion of district's teachers who taught in the district last year
MASSEXP	mean years experience for teachers in the district in their particular assignment
MSIZE	mean class size in the diatrict
PMIX	proportion of the district's classes that are of mixed skill level
MHOMOG	mean quality in homogeneous classes in the district (1=below average, 2=average, 3=above average, 4=honors, 5-advanced placement)
INDP	percentage of students that are American Indian
BLKP	percentage of students that are black
HISP	percentage of students that are Hispanic
LIMEP	percentage of students with limited English proficiency
SOCIN	diatrict socioeconomic indicator (percentage of children age 5 to 17 in families below the poverty line)
STUABS	average number of days students in the district were absent

Data Sources: Authors' computations from various New York State Education Department sources: (1) <u>1987 Comprehensive Assessment Report Data File</u> - PEP3 to REGENTS; (2) <u>1986-87 Basic Educational Data System</u> (<u>BEDS</u>) - INDP to SOCIN; (3) <u>1986-87 Annual Educational Summary</u> (preliminary tables) - STUABS; (4) <u>1986-87 Personnel Master File</u> - PMALE to MHOMOG;

and

[a] variable used is average for elementary grade teachers in PEP3, PEP6, PEPA, PET, and PCT equations and average for secondary grade teachers in RCT and REGENTS equation;

[b] also included in the equation are controls for the fraction of eligible students who took the PCT tests and the grades and times of year that the PCT reading and writing tests were given;

[c] also included in the equation is a control for the fraction of eligible students who took the regents exams.

Table 7

Marginal Effects of Student Absence Days and Teacher Use of Leave Days on the Percentage of New York State School District Students that Passed Various Standardized Tests in the 1986-87 Academic Year[a]
(absolute value t statistic)

	PEP3	PEP6	PEPA	PET	PCT	RCT	REGENTS
STUABS	-.311 (3.6)*	-.532 (4.8)*	-.387 (5.0)*	-1.357 (4.1)*	-.340 (3.3)*	-.824 (7.1)*	-.422 (3.6)*
LEAVEA	.027 (0.3)	.032 (0.3)	.014 (0.2)	-.032 (0.1)	-.173 (1.9)**	.007 (0.0)	-.063 (0.6)
STUABS	-.312 (3.7)*	-.528 (4.7)*	-.384 (5.0)*	-1.363 (4.2)*	-.355 (3.5)*		
LEAVEE	.077 (1.1)	.017 (0.2)	.023 (0.4)	.008 (0.0)	-.155 (1.8)**		
STUABS						-.825 (7.2)*	-.406 (3.5)*
LEAVES						.033 (0.3)	-.105 (0.9)

[a]All the explanatory variables included in Table 6 are included in the underlying analyses as well as a dummy variable for nonreporting of teacher usage of leave days.

where

LEAVEA leave days used in 1986-87 per teacher in the district

LEAVEE leave daya used in 1986-87 per elementary school teacher in the district

LEAVES leave days used in 1986-87 per high school teacher in the district