Data Appendix – For Online Publication

DA1 Introduction

In this Data Appendix, we describe the construction of the Kentucky School Teacher Leave Dataset (KSTLD), which is the main data source for Cronin, Harris, and Ziebarth (2022). Moreover, we describe sick-leave and other policies relevant for school teachers in the Scott County School District.

DA1.1 Scott County School District

Kentucky has a total of 172 school districts for its 120 counties. Scott County, located in central Kentucky, is the 17th most populous county in the state. In 2020, it had 57,155 residents and a single public school district, the Scott County Schools District (SCSD).[1] The SCSD is the 12th largest in the state, comprised of sixteen schools, with approximately 9,300 enrolled students and 1,364 faculty and staff.[2]

Most SCSD full-time employees are contracted for a 189 day school year. On the remaining 176 days of the year, which include weekends, holidays, and spring, summer, winter, and fall break, no work is required. Base compensation is determined by experience and education. For example, Figure DA1 contains the 2018–2019 salary schedule. The salary schedule is tied to the 187 school year. Teachers are contracted for an additional two "in service" days, for which they receive extra compensation at their daily wage rate. For example, base compensation for a teacher with 5 years of experience and a masters degree is $47,526, plus $508.30 for two in service days.

There are several ways in which teachers and school administrators can earn more than this base pay:

- Taking on additional paid roles that require out-of-school work, such as athletic team coaches, club leaders, choir directors, etc. These wage rates vary, but are tied to base pay—for example, the high school yearbook coordinator received 107% of their base salary.

[1] https://www.kentucky-demographics.com/counties_by_population

[2] https://www.greatschools.org/kentucky/georgetown/scott-county-school-district/, https://www.scott.k12.ky.us/district_staff.aspx?action=search&location=0&department=0

Figure DA1: 2018–2019 Scott County Public Schools Salary Schedule

Completed Years Experience	RANK III 31	RANK II 21	RANK I 11	RANK I - A 12
0	38,763	42,809	47,279	48,135
1	38,924	42,971	47,438	48,295
2	38,924	42,971	47,438	48,295
3	38,924	42,971	47,438	48,295
4	41,939	46,434	50,922	51,756
5	42,938	47,526	52,105	52,955
6	42,938	47,526	52,105	52,955
7	42,938	47,526	52,105	52,955
8	42,938	47,526	52,105	52,955
9	42,938	47,526	52,105	52,955
10	46,653	51,348	56,137	57,853
11	47,748	52,539	57,429	59,178
12	47,748	52,539	57,429	59,178
13	47,748	52,539	57,429	59,178
14	47,748	52,539	57,429	59,178
15	50,060	55,021	60,045	62,619
16	51,225	56,294	61,414	64,040
17	51,225	56,294	61,414	64,040
18	51,225	56,294	61,414	64,040
19	51,225	56,294	61,414	64,040
20	52,534	57,599	62,673	65,268
21	53,216	58,340	63,461	66,085
22	53,216	58,340	63,461	66,085
23	53,216	58,340	63,461	66,085
24	53,216	58,340	63,461	66,085
25	54,694	59,769	64,840	67,439
26	55,403	60,529	65,652	68,275
27	55,403	60,529	65,652	68,275
28	55,403	60,529	65,652	68,275
29	55,403	60,529	65,652	68,275
30	55,403	60,529	65,652	68,275
41 Rank IV	32,797	(96 to 128 credit hours)		
51 Rank V	30,061	(54-95 credit hours)		

Notes: Rank III corresponds to a bachelors degree, Rank II a masters degree, Rank I is an additional teaching certificate earned post-masters degree, and Rank I-A is a PhD or EdD. Both Rank IV and V correspond to individuals who have not attained a bachelors degree, but have some college credit. Individuals can only be hired to full time teaching positions on a temporary basis (e.g., long term substitute teachers) without a bachelors degree.

- For administrators, such as principles and vice principles, base compensation is determined by the salary schedule, but they (i) work more days than teachers and (ii) receive a lump-sum bonus. For example, the typical principle in our data works 230 days per year; thus, if they have 15 years of experience and a masters degree, they earn roughly a $15,000 bonus, plus $67,672.89 for their 230 days, rather than $55,609.46 for 189 days. Assistant principles and guidance councilors are similar, but may work fewer days and earn smaller bonuses.

- School psychologists earn the base pay plus 8%

DA1.2 SCSD Sick Leave Policy

The Kentucky Department of Education imposes the following rules on school districts regarding sick-leave:[3]

- Districts must provide teachers with a minimum of 10 paid leave days.

- Districts must allow unused leave-days to accumulate without limit.

- Starting July 1, 1982, districts *may* compensate teachers at the time of retirement for *up to* 30% of their unused leave days in a lump sum. Moreover, this lump sum transfer counts towards the teachers last year of income when factoring in retirement (discussed below).

Like many districts, the SCSD grants teachers 13 days of paid leave per academic year: 10 sick days, 2 emergency days, and 1 personal day. Emergency/Personal days differ from sick days in that teachers must request permission from a supervisor to take an emergency/personal day, meaning they may be denied.[4] All unused paid leave days remaining at the end of an academic year are converted to sick days and banked for the following year; thus, most teachers, particularly experienced ones, have a stock of paid leave that is much larger than the 13 days granted at the start of each year. Teachers can choose to take unpaid leave, but only after depleting their stock.

Upon retirement, teachers are paid for any unused leave. We detail the exact relationship between leave stock and retirement compensation in Section DA4 below. For now, simply note

[3] http://www.lrc.ky.gov/Statutes/statute.aspx?id=47842

[4] Since the 2016/17 school year, no distinction has been made between personal and emergency days; all are simply called personal days.

that retirement pay is increasing almost linearly in accumulated stock at the time of retirement, up to a cap of 300 days.

DA2 Original Data Sources and Merge

The Kentucky School Teacher Leave Dataset (KSTLD) is a record of individual employment activity for teachers in the SCSD on every calendar day between August 1, 2010 and June 29, 2018. Retrospective school calendars were provided by the district, indicating whether school was in session for each of these days for planned (e.g., holidays) or unplanned (e.g., snow day) reasons. For any day that school is in session, the KSTLD records (among other things) the teacher's stock of available sick leave and their leave activity. All teacher-level information is supplied by either SCSD administrators or the Kentucky Department of Education (KDE). Below, we describe each original data source and the process used to merge and clean the two data files.

DA2.1 Scott County Data

Administrators from the SCSD provided us with two files on teacher attendance. The first file records all paid leave events. The second file records all pay periods in which a teacher's pay was "docked." Both files cover all SCSD employees working in the county at any point in time between the 2010/11 and 2017/18 school years.

In the paid leave file, an observation is a teacher-event where the following correspond to an event:

- Taking any fraction of a school day off and receiving paid leave.
- A donation to or receipt of leave from another SCSD employee.
- Earning leave, which occurs at the start of the school year.

Each event specifies the type (sick, personal, or emergency) and corresponding date that leave was received/deducted. For every employee, we see the available stock of sick leave *on one date only*.[5] From this point in time, using the full history of leave used and earned, we

[5]The exact date depends on the employee's current employment status. For those no longer employed entering the 2018/19 school year, we see their stock at the end of the year *prior to* their exit. For those still employed entering the 2018/19 school year, we see their stock at the end of the 2017/18.

calculate the stock available to each teacher on every school day from school years 2010/11 to 2017/18.

A separate "dock day" file records unpaid leave. This file also consists of teacher-event observations. Each event records the number of days of work that the employee's pay is docked, as well as the dollar amount. The following describe possible events:

- Taking unpaid leave, either because (i) the individual depleted their stock or (ii) the individual requested a personal or emergency day, was denied, but took the day off nonethe-less (for example, requesting to take a personal day on the Friday before Spring Break and being denied). Note both of these events represent absence from work; however, they have no impact on one's stock of paid leave.
- Salary deductions for incomplete training. More specifically, a school year is defined by 187 instructional days, plus two mandatory training days. As teacher contracts are defined by a 189 day year, salaries are docked when teachers do not complete these trainings. Trainings do not take place on instructional days; thus, these events do not represent missed instructional days, and also have no impact on one's stock of sick leave.

The dock day file provides less information about each event than the paid leave file. First, we cannot observe the reason for docked pay. Second, the date provided for each event is the pay date upon which the teacher was docked, not the missed day of school or training. As the KSTLD file records teacher activity on instructional days, we need to (1) separately identify unpaid leave days from incomplete training and (2) impute the date of unpaid leave days (i.e., missed trainings are irrelevant for our purposes).

We make several assumptions. First, according to SCSD officials, all salary deductions for incomplete training are imposed on the last pay check of the school year, which occurs in the last week of June. Thus, all dock day events occurring on this pay check are assumed to be incomplete training penalties and are, thus, dropped from the data.[6] Second, among the remaining events, the unpaid leave day must be taken in the 45 to 30 day window prior to the corresponding pay date. If paid leave is observed in this window, we assume unpaid leave was taken immediately following the last observed paid leave day. If no paid leave is observed in

[6]Note that in doing this, we likely inadvertently drop some true unpaid leave that occurs in the last two weeks of school. As such, we modify this rule on a case-by case basis. Specifically, if a teacher has no available (paid) leave at any point during this two week period, then we assume that the dock-day event is unpaid leave.

Data Appendix – For Online Publication

DA1 Introduction

In this Data Appendix, we describe the construction of the Kentucky School Teacher Leave Dataset (KSTLD), which is the main data source for Cronin, Harris, and Ziebarth (2022). Moreover, we describe sick-leave and other policies relevant for school teachers in the Scott County School District.

DA1.1 Scott County School District

Kentucky has a total of 172 school districts for its 120 counties. Scott County, located in central Kentucky, is the 17th most populous county in the state. In 2020, it had 57,155 residents and a single public school district, the Scott County Schools District (SCSD).[1] The SCSD is the 12th largest in the state, comprised of sixteen schools, with approximately 9,300 enrolled students and 1,364 faculty and staff.[2]

Most SCSD full-time employees are contracted for a 189 day school year. On the remaining 176 days of the year, which include weekends, holidays, and spring, summer, winter, and fall break, no work is required. Base compensation is determined by experience and education. For example, Figure DA1 contains the 2018–2019 salary schedule. The salary schedule is tied to the 187 school year. Teachers are contracted for an additional two "in service" days, for which they receive extra compensation at their daily wage rate. For example, base compensation for a teacher with 5 years of experience and a masters degree is $47,526, plus $508.30 for two in service days.

There are several ways in which teachers and school administrators can earn more than this base pay:

- Taking on additional paid roles that require out-of-school work, such as athletic team coaches, club leaders, choir directors, etc. These wage rates vary, but are tied to base pay—for example, the high school yearbook coordinator received 107% of their base salary.

[1] https://www.kentucky-demographics.com/counties_by_population

[2] https://www.greatschools.org/kentucky/georgetown/scott-county-school-district/, https://www.scott.k12.ky.us/district_staff.aspx?action=search&location=0&department=0

Figure DA1: 2018–2019 Scott County Public Schools Salary Schedule

Completed Years Experience	RANK III 31	RANK II 21	RANK I 11	RANK I - A 12
0	38,763	42,809	47,279	48,135
1	38,924	42,971	47,438	48,295
2	38,924	42,971	47,438	48,295
3	38,924	42,971	47,438	48,295
4	41,939	46,434	50,922	51,756
5	42,938	47,526	52,105	52,955
6	42,938	47,526	52,105	52,955
7	42,938	47,526	52,105	52,955
8	42,938	47,526	52,105	52,955
9	42,938	47,526	52,105	52,955
10	46,653	51,348	56,137	57,853
11	47,748	52,539	57,429	59,178
12	47,748	52,539	57,429	59,178
13	47,748	52,539	57,429	59,178
14	47,748	52,539	57,429	59,178
15	50,060	55,021	60,045	62,619
16	51,225	56,294	61,414	64,040
17	51,225	56,294	61,414	64,040
18	51,225	56,294	61,414	64,040
19	51,225	56,294	61,414	64,040
20	52,534	57,599	62,673	65,268
21	53,216	58,340	63,461	66,085
22	53,216	58,340	63,461	66,085
23	53,216	58,340	63,461	66,085
24	53,216	58,340	63,461	66,085
25	54,694	59,769	64,840	67,439
26	55,403	60,529	65,652	68,275
27	55,403	60,529	65,652	68,275
28	55,403	60,529	65,652	68,275
29	55,403	60,529	65,652	68,275
30	55,403	60,529	65,652	68,275
41 Rank IV	32,797	(96 to 128 credit hours)		
51 Rank V	30,061	(54-95 credit hours)		

Notes: Rank III corresponds to a bachelors degree, Rank II a masters degree, Rank I is an additional teaching certificate earned post-masters degree, and Rank I-A is a PhD or EdD. Both Rank IV and V correspond to individuals who have not attained a bachelors degree, but have some college credit. Individuals can only be hired to full time teaching positions on a temporary basis (e.g., long term substitute teachers) without a bachelors degree.

- For administrators, such as principles and vice principles, base compensation is determined by the salary schedule, but they (i) work more days than teachers and (ii) receive a lump-sum bonus. For example, the typical principle in our data works 230 days per year; thus, if they have 15 years of experience and a masters degree, they earn roughly a $15,000 bonus, plus $67,672.89 for their 230 days, rather than $55,609.46 for 189 days. Assistant principles and guidance councilors are similar, but may work fewer days and earn smaller bonuses.

- School psychologists earn the base pay plus 8%

DA1.2 SCSD Sick Leave Policy

The Kentucky Department of Education imposes the following rules on school districts regarding sick-leave:[3]

- Districts must provide teachers with a minimum of 10 paid leave days.

- Districts must allow unused leave-days to accumulate without limit.

- Starting July 1, 1982, districts *may* compensate teachers at the time of retirement for *up to* 30% of their unused leave days in a lump sum. Moreover, this lump sum transfer counts towards the teachers last year of income when factoring in retirement (discussed below).

Like many districts, the SCSD grants teachers 13 days of paid leave per academic year: 10 sick days, 2 emergency days, and 1 personal day. Emergency/Personal days differ from sick days in that teachers must request permission from a supervisor to take an emergency/personal day, meaning they may be denied.[4] All unused paid leave days remaining at the end of an academic year are converted to sick days and banked for the following year; thus, most teachers, particularly experienced ones, have a stock of paid leave that is much larger than the 13 days granted at the start of each year. Teachers can choose to take unpaid leave, but only after depleting their stock.

Upon retirement, teachers are paid for any unused leave. We detail the exact relationship between leave stock and retirement compensation in Section DA4 below. For now, simply note

[3] http://www.lrc.ky.gov/Statutes/statute.aspx?id=47842

[4] Since the 2016/17 school year, no distinction has been made between personal and emergency days; all are simply called personal days.

that retirement pay is increasing almost linearly in accumulated stock at the time of retirement, up to a cap of 300 days.

DA2 Original Data Sources and Merge

The Kentucky School Teacher Leave Dataset (KSTLD) is a record of individual employment activity for teachers in the SCSD on every calendar day between August 1, 2010 and June 29, 2018. Retrospective school calendars were provided by the district, indicating whether school was in session for each of these days for planned (e.g., holidays) or unplanned (e.g., snow day) reasons. For any day that school is in session, the KSTLD records (among other things) the teacher's stock of available sick leave and their leave activity. All teacher-level information is supplied by either SCSD administrators or the Kentucky Department of Education (KDE). Below, we describe each original data source and the process used to merge and clean the two data files.

DA2.1 Scott County Data

Administrators from the SCSD provided us with two files on teacher attendance. The first file records all paid leave events. The second file records all pay periods in which a teacher's pay was "docked." Both files cover all SCSD employees working in the county at any point in time between the 2010/11 and 2017/18 school years.

In the paid leave file, an observation is a teacher-event where the following correspond to an event:

- Taking any fraction of a school day off and receiving paid leave.
- A donation to or receipt of leave from another SCSD employee.
- Earning leave, which occurs at the start of the school year.

Each event specifies the type (sick, personal, or emergency) and corresponding date that leave was received/deducted. For every employee, we see the available stock of sick leave *on one date only*.[5] From this point in time, using the full history of leave used and earned, we

[5]The exact date depends on the employee's current employment status. For those no longer employed entering the 2018/19 school year, we see their stock at the end of the year *prior to* their exit. For those still employed entering the 2018/19 school year, we see their stock at the end of the 2017/18.

calculate the stock available to each teacher on every school day from school years 2010/11 to 2017/18.

A separate "dock day" file records unpaid leave. This file also consists of teacher-event observations. Each event records the number of days of work that the employee's pay is docked, as well as the dollar amount. The following describe possible events:

- Taking unpaid leave, either because (i) the individual depleted their stock or (ii) the individual requested a personal or emergency day, was denied, but took the day off nonethe-less (for example, requesting to take a personal day on the Friday before Spring Break and being denied). Note both of these events represent absence from work; however, they have no impact on one's stock of paid leave.
- Salary deductions for incomplete training. More specifically, a school year is defined by 187 instructional days, plus two mandatory training days. As teacher contracts are defined by a 189 day year, salaries are docked when teachers do not complete these trainings. Trainings do not take place on instructional days; thus, these events do not represent missed instructional days, and also have no impact on one's stock of sick leave.

The dock day file provides less information about each event than the paid leave file. First, we cannot observe the reason for docked pay. Second, the date provided for each event is the pay date upon which the teacher was docked, not the missed day of school or training. As the KSTLD file records teacher activity on instructional days, we need to (1) separately identify unpaid leave days from incomplete training and (2) impute the date of unpaid leave days (i.e., missed trainings are irrelevant for our purposes).

We make several assumptions. First, according to SCSD officials, all salary deductions for incomplete training are imposed on the last pay check of the school year, which occurs in the last week of June. Thus, all dock day events occurring on this pay check are assumed to be incomplete training penalties and are, thus, dropped from the data.[6] Second, among the remaining events, the unpaid leave day must be taken in the 45 to 30 day window prior to the corresponding pay date. If paid leave is observed in this window, we assume unpaid leave was taken immediately following the last observed paid leave day. If no paid leave is observed in

[6]Note that in doing this, we likely inadvertently drop some true unpaid leave that occurs in the last two weeks of school. As such, we modify this rule on a case-by case basis. Specifically, if a teacher has no available (paid) leave at any point during this two week period, then we assume that the dock-day event is unpaid leave.

this window, we randomly select a day in this window in which unpaid leave was take. In both instances, if multiple unpaid leave days were taken, we assume they were taken consecutively.

Importantly, note that there are over 93,000 events in the raw paid leave file, but just 663 events in the dock day file; thus, true unpaid leave represents well under 1% of the total leave taken in the data. As such, the assumptions discussed above are unlikely to have any significant impact on our findings and many of our findings (e.g., those related to sick leave use) exclude this type of leave entirely.

DA2.2 State Data

While stock of sick leave and teacher activity are measured at the daily level, all other variables in the KSTLD data file are measured at the employee-academic year level. Most of these data are provided by the Kentucky Center for Statistics (KCS). Specifically, the KCS maintains the Kentucky Longitudinal Data System (KLDS), which follows Kentucky teachers and administrators over their careers as educators.[7] From the KCS, we received a subset of the KLDS, corresponding to Scott County teachers and administrators only. Specifically, for every individual that taught (at any time) in SCSD during the academic years 2010/11 to 2017/18, we receive a full history of their KDE employment, going back to 2009, including work outside of Scott County.

Among the variables provided in the KLDS, the following permanent and academic-year specific variable are included:

- Permanent: gender, race, and degree granting institution.
- Time-varying: educational rank, experience as an educator in Kentucky, annual base salary, supplemental salary, current district name, name of school, and job title (e.g., middle school teacher, assistant principle, guidance councilor, etc.).

DA2.3 Merge

The KCS merged the paid leave file described in DA2.1 with the KLDS. KLDS data contains first and last names, date of birth, as well as a state identification number (i.e., EPSBID), for 100% of observations. The paid leave file also contained first and last names and date of birth

[7] To learn more about the KLDS, visit `https://kcews.ky.gov/`. Note the KLDS does not contain information on school staff, such as cafeteria workers, bus drivers, substitute teachers, administrative assistants, etc.

for 100% of observations, but EPSBID for just 40%. As such, observations were first merged by EPSBID, then by first and last name and date of birth.

We eliminated anyone from the SC data that was not a "certified employee," which essentially includes full-time teachers, school administrators (e.g., principles, vice principles, deans, etc.), guidance councilors, psychologists, social workers, librarians, and speech therapists. This leads to a data file with 1,046 employees, 4,816 employee-years, and 60,464 leave events. KCS then matched this information to the KLDS. Only 12 individuals could not be located in the KLDS. Among the 1,034 matches, KLDS had time-invariant demographic information for all but 36 individuals; these individuals were dropped from our analysis. The resulting sample contained 998 individuals and 4,730 teacher-year observations. 96.4% of the paid leave events in this sample were correctly matched to appropriate teacher-year data in the KLDS.

The remaining 3.6% of unmatched data was carefully evaluated on a case-by-case basis. Two situations account for most of this mismatch. First, the KLDS gatheres data from school districts on the first day of the school year. Thus, any teacher beginning the school year late is missing from the KLDS in that year; moreover, any teacher switching schools during the school year is only attached to the first school.[8] Second, young teachers often work as student teachers, teaching assistants, and teachers aids in the year prior to their first year of employment. During this pre-certified employment year, the future teachers bank any unused sick leave; however, KLDS does not collect employment information in this year. These individuals then show up in the KLDS, with zero years of experience, in their first year as full time teachers. After evaluating each of these cases individually and eliminating inconsistent/irrelevant observations, the final sample contains 982 teachers, 4,580 teacher-years, 52,695 leave events.

DA3 Special Events

Of the 4,580 teacher-years described above, 96.7% are "typical" in the sense that the teacher is working on the first day of school and continues working until the conclusion of the school-year. Below, we describe the sources of atypical entry and exit. To aid in this discussion, it is useful to describe two variables that we create and the values these variables can take. Note that each teacher-year is ultimately described by both an entry and exit code.

[8]Note, this accounts for most of the non-matched and demographic only matched teachers discussed above. If an individual only teaches for one year and begins that year late, she may never enter the KLDS data.

- Variable 1: *entry_code* is a two digit code containing one number, describing current year's employment in relation to prior year, and one letter, describing the timing of one's entry and the status of one's sick leave-stock. The codes have the following meanings:

  0. first year employee is observed in the SC data
  1. continued employment, with no gap in service
  2. continued employment, returning from gap in service

  a. working on first day of school with stock from prior years
  b. working on first day of school with no stock
  c. not working on first day of school with stock from prior years
  d. not working on first day of school with no stock

- Variable 2: *exit_code* is similarly defined, though the number describes what the employee does in the following school year, and the letter describes the timing of exit and what happens to one's personal/emergency days.

  0. renewed at the beginning of the following school year—i.e., works for SCSD in the following year.
  1. moves to another KY school district
  2. retires from teaching
  3. stops teaching in KY

  a. works the last day of the year and personal/emergency days converted into future sick leave
  b. works the last day of the year and personal/emergency days NOT converted into future sick leave
  c. exits prior to the last day of the year and personal/emergency days converted into future sick leave (this never happens, but is included for completeness)
  d. exits prior to the last day of the year and personal/emergency days NOT converted into future sick leave

Entry and exit frequencies appear in Table DA1. We discuss special events related to this table in the following subsections.

this window, we randomly select a day in this window in which unpaid leave was take. In both instances, if multiple unpaid leave days were taken, we assume they were taken consecutively.

Importantly, note that there are over 93,000 events in the raw paid leave file, but just 663 events in the dock day file; thus, true unpaid leave represents well under 1% of the total leave taken in the data. As such, the assumptions discussed above are unlikely to have any significant impact on our findings and many of our findings (e.g., those related to sick leave use) exclude this type of leave entirely.

DA2.2 State Data

While stock of sick leave and teacher activity are measured at the daily level, all other variables in the KSTLD data file are measured at the employee-academic year level. Most of these data are provided by the Kentucky Center for Statistics (KCS). Specifically, the KCS maintains the Kentucky Longitudinal Data System (KLDS), which follows Kentucky teachers and administrators over their careers as educators.[7] From the KCS, we received a subset of the KLDS, corresponding to Scott County teachers and administrators only. Specifically, for every individual that taught (at any time) in SCSD during the academic years 2010/11 to 2017/18, we receive a full history of their KDE employment, going back to 2009, including work outside of Scott County.

Among the variables provided in the KLDS, the following permanent and academic-year specific variable are included:

- Permanent: gender, race, and degree granting institution.
- Time-varying: educational rank, experience as an educator in Kentucky, annual base salary, supplemental salary, current district name, name of school, and job title (e.g., middle school teacher, assistant principle, guidance councilor, etc.).

DA2.3 Merge

The KCS merged the paid leave file described in DA2.1 with the KLDS. KLDS data contains first and last names, date of birth, as well as a state identification number (i.e., EPSBID), for 100% of observations. The paid leave file also contained first and last names and date of birth

[7] To learn more about the KLDS, visit `https://kcews.ky.gov/`. Note the KLDS does not contain information on school staff, such as cafeteria workers, bus drivers, substitute teachers, administrative assistants, etc.

for 100% of observations, but EPSBID for just 40%. As such, observations were first merged by EPSBID, then by first and last name and date of birth.

We eliminated anyone from the SC data that was not a "certified employee," which essentially includes full-time teachers, school administrators (e.g., principles, vice principles, deans, etc.), guidance councilors, psychologists, social workers, librarians, and speech therapists. This leads to a data file with 1,046 employees, 4,816 employee-years, and 60,464 leave events. KCS then matched this information to the KLDS. Only 12 individuals could not be located in the KLDS. Among the 1,034 matches, KLDS had time-invariant demographic information for all but 36 individuals; these individuals were dropped from our analysis. The resulting sample contained 998 individuals and 4,730 teacher-year observations. 96.4% of the paid leave events in this sample were correctly matched to appropriate teacher-year data in the KLDS.

The remaining 3.6% of unmatched data was carefully evaluated on a case-by-case basis. Two situations account for most of this mismatch. First, the KLDS gatheres data from school districts on the first day of the school year. Thus, any teacher beginning the school year late is missing from the KLDS in that year; moreover, any teacher switching schools during the school year is only attached to the first school.[8] Second, young teachers often work as student teachers, teaching assistants, and teachers aids in the year prior to their first year of employment. During this pre-certified employment year, the future teachers bank any unused sick leave; however, KLDS does not collect employment information in this year. These individuals then show up in the KLDS, with zero years of experience, in their first year as full time teachers. After evaluating each of these cases individually and eliminating inconsistent/irrelevant observations, the final sample contains 982 teachers, 4,580 teacher-years, 52,695 leave events.

DA3 Special Events

Of the 4,580 teacher-years described above, 96.7% are "typical" in the sense that the teacher is working on the first day of school and continues working until the conclusion of the school-year. Below, we describe the sources of atypical entry and exit. To aid in this discussion, it is useful to describe two variables that we create and the values these variables can take. Note that each teacher-year is ultimately described by both an entry and exit code.

[8]Note, this accounts for most of the non-matched and demographic only matched teachers discussed above. If an individual only teaches for one year and begins that year late, she may never enter the KLDS data.

- Variable 1: *entry_code* is a two digit code containing one number, describing current year's employment in relation to prior year, and one letter, describing the timing of one's entry and the status of one's sick leave-stock. The codes have the following meanings:

  0. first year employee is observed in the SC data
  1. continued employment, with no gap in service
  2. continued employment, returning from gap in service

  a. working on first day of school with stock from prior years
  b. working on first day of school with no stock
  c. not working on first day of school with stock from prior years
  d. not working on first day of school with no stock

- Variable 2: *exit_code* is similarly defined, though the number describes what the employee does in the following school year, and the letter describes the timing of exit and what happens to one's personal/emergency days.

  0. renewed at the beginning of the following school year—i.e., works for SCSD in the following year.
  1. moves to another KY school district
  2. retires from teaching
  3. stops teaching in KY

  a. works the last day of the year and personal/emergency days converted into future sick leave
  b. works the last day of the year and personal/emergency days NOT converted into future sick leave
  c. exits prior to the last day of the year and personal/emergency days converted into future sick leave (this never happens, but is included for completeness)
  d. exits prior to the last day of the year and personal/emergency days NOT converted into future sick leave

Entry and exit frequencies appear in Table DA1. We discuss special events related to this table in the following subsections.

Table DA1: Entry and Exit Frequency

Code	Entry		Exit	
	freq.	%	freq.	%
0a	601	13.13	4,074	89.03
0b	300	6.56	22	0.48
0c	8	0.17		
0d	72	1.57	12	0.26
1a	3,565	77.91	20	0.44
1b			120	2.62
1c	3	0.07		
1d	4	0.09	9	0.2
2a	16	0.35	21	0.46
2b	3	0.07	102	2.23
2c	2	0.04		
2d	2	0.04	11	0.24
3a			25	0.55
3b			129	2.82
3c				
3d			31	0.68
total	4,580	100.0	4,580	100.0

* Notes: among those with an entry code of 0a, 469 represent academic year 2011, meaning these educators are very likely to be continuing SCSD employment from the previous year, but this cannot be verified.

DA3.1 Maternity Leave

SCSD has no separate system of paid maternity leave.[9] In compliance with the FMLA, employees are entitled to 12 weeks of leave following the birth or adoption of the child. Employees are permitted to use up to 30 days of paid sick leave on the first thirty days of this period. More paid leave can be used if need is verified by a physician. Employees can further request that the superintendent allow them to take the remainder of the year as unpaid leave (this would register an exit code of 0d in the birth-year and an entry code of 1b in the following year); after which, requests must be made in one year increments.[10]

As maternity leave is treated no differently than an extended absence for an illness by the district, we cannot identify it explicitly in the data. Rather, maternity leave appears as consecutive days and weeks of paid leave. One way to get a sense of how much maternity may contribute to overall leave use in the data is to focus on long spells for women under the age of 45. Leave spells in excess of 20 days among this group make up roughly 10% of all leave in the data; there are 149 teacher-years containing such a spell. If the threshold for possible maternity is raised to 30 days, then 72 teacher-years contain such spells and 6% of leave is due to maternity.

DA3.2 Partial Year Employment

Table DA1 shows that less than two percent of employees do not start on the first day of school in a given school year. Overwhelmingly, these teachers start within a month of the start of the school year. Most commonly, these are brand-new teachers (i.e., entry code 0d) and the reason for late entry is that schools do not know their exact funding until enrollment has been determined. As such, it is common for schools to hire new (i.e., zero experience) teachers — often those who previously did their student teaching at the school — only after confirming enrollment and receiving funding for the position. The other rational for late hires is the replacement of employees exiting mid-year. The table shows that early exits are very rare (i.e., exit code "d").

In all instances where employees begin the school year late, the sick, personal, and emergency days that they accrue are pro-rated according to how much of the school year that they

[9] https://www.scott.k12.ky.us/docs/district/depts/38/16-17%20employeemanual.pdf

[10] In all instances of early exit due to what appears to be maternity, all leave is used prior to exit. Were a teacher to take the following year off due to maternity, the entry code upon re-entry would be 2a or 2b.

miss.

DA3.3 Job Transitions

There are four transitions that an employee might make from one year to the next. We discuss each below as it pertains to our entry and exit codes.

1. Employed in Kentucky district A or B in year t, followed by employment in Kentucky district B or C in year $t+1$. All such transitions, where the SCSD is represented by B, are observable in our data. Importantly, so long as there is no break in service between the two jobs, all accumulated sick-leave possessed at the end of year t is available at the start of year $t+1$ (even when moving districts). For continuously employed individuals entering SCSD from another KY district, their entry code is 0a/c. For continuing SCSD employees, their entry code is 1a/c. For SCSD employees exiting to another KY district at the conclusion of an academic year, their exit code is 1a/b.[11]

2. Employed in Kentucky district A or B in year t, takes a leave of absence (partial year, full year, or multiple years), then works in Kentucky district B or C in the future. All such transitions, where the SCSD is represented by B, are observable in our data. Importantly, if the leave of absence was approved by the originating school board, then the individual carries their sick leave balance with them when they return to work. If the leave was not approved, then all leave is lost upon returning to work. For such individuals returning to SCSD, following an approved break from SCSD, the enter code is 2a/c; an unapproved break would lead to 2b/d. For such individuals entering SCSD, following an approved (unapproved) break from another Kentucky district, the enter code is 0a/c (0b/d).

3. Employed by SCSD and exit Kentucky teaching (or vice-versa). Those simply exiting Kentucky teaching have an exit code beginning with "3." Those entering teaching in SCSD for the first time with no prior experience have an entry code of "0b." Some educators enter the SCSD data with no history of teaching in the data, but a positive sick leave balance. These individuals have very likely been educators moving in from our of state, who negotiated retaining their balance from prior employment. These individuals have

[11] Upon exiting SCSD for another Kentucky School district, unused sick days are always rolled forward to the following year. Most of the time, personal/emergency days are *not* rolled forward, as personal/emergency days vary by district. In the few instances that they are rolled forward, we see in the data that the employee eventually returns to SCSD, and is credited with these days.

an entry code of "0a/c." For those exiting SCSD to work in education in another state, we (i) have no information to suggest that they are in fact teaching in another state and (ii) cannot determine whether their sick leave balance is rolled over. These individuals have an exit code beginning with "3."

4. Employed by SCSD to Retirement (or vice-versa). Retirement is not explicitly stated in either the Scott County leave data or KLDS. Employees simply exit both, making retirement difficult to infer. Scott County supplied us with an additional data file containing an incomplete list of retirements for the years of study. We were also able to obtain board meeting notes that listed the names of retirees and related dates. From these two sources, we identified a total of 89 retirees (exit code beginning in "2"), 11 of which did not complete their final year (exit code "2d"). Table DA1 shows another 35 retirees. These individuals exited SCSD without moving to another district, while either (i) exceeding the age of 55 or (ii) completing more than 27 years of experience. Younger individuals exiting the profession may still *eventually* receive retirement, but they are not eligible until 55. We drop anyone returning to work as a certified employee post-retirement from the sample.

DA4 Retirement

DA4.1 Retirement Formula

When KDE certified employees retire, they are paid monthly until they die by the state. The formula for an employee's annual retirement benefit has just 3 inputs – years of service (Y), a multiplier (M), and annual income (I) – and is a very simple product:

$$\text{Annual Retirement Income} = Y * M * I$$

This value then grows at a fixed 1.5% per year post-retirement. Each of these inputs is described below:

- Years of service (Y) measures total years of service as a Kentucky educator. This measure is mostly straightforward, with few exceptions, such as taking an unpaid year off to have a baby or carrying in prior years of service from another state. In these instances, teachers

have the opportunity to "buy years of service" but, which is expensive and fairly rare.[12]

- The multiplier (M) is determined by one's years of service and date of entry into the profession, according to the following table:

Figure DA2: KDE Retirement Multiplier

Multipliers for Non-university			
Year of Service*	**Entry Prior to July 1, 2002**	**Entry on or after July 1, 2002**	**Entry on or after July 1, 2008**
1 – 10.0	2.5%	2%	1.7%
10.01 – 20.0	2.5%	2.5%	2%
20.01 – 26.0	2.5%	2.5%	2.3%
26.01 – 30.0	2.5%	2.5%	2.5%

* Years prior to 1983-84 are at 2 percent. For each new tier of service credit attained, all prior years convert to the new multiplier, up to 30 years of service. Any years in excess of 30 (and only those years) use a multiplier of 3 percent.

- Annual Income (I) can be calculated in two different ways. If an individual is over 55 years of age and has completed 27 or more years of service, then annual income is calculated as average income from the individuals **three highest earning years of service**. If the individual is younger than 55, or has completed fewer than 27 years of service, annual income is calculated as average income from the individuals five highest earning years of service.

DA4.2 Eligibility

KDE certified employees who start teaching prior to July 1, 2008 are not eligible to retire prior to 5 years of service. An employee with between 5 and 27 years of service can retire once they reach 55. Importantly, note that they do not need to be working when they reach age 55 in order to earn benefits - e.g., an employee with 10 years of experience that quits at age 45 begins receiving payments once she reaches age 55. Thus, anyone with more that 5 years of experience *eventually* receives retirement benefits.[13] Once 27 years of service is reached, educators can retire with no penalty.

KDE certified employees who start teaching after July 1, 2008 are not eligible for retirement until 10 years of service and the early retirement penalty is 6%, rather than 5%.

[12] See the following for more details: https://trs.ky.gov/active-members/retirement-planning/increasing-service-credit/

[13] Any teacher with less than 27 years of service pays a 5% penalty for (i) each year that her age is under 60 or (ii) each year that her service is less than 27 years, whichever is smaller. All retirees eventually age out of this penalty.

DA4.3 Role that Sick Leave Plays in Retirement

As discussed above, the state allows districts to compensate teachers for up to 30% of the value of their unused sick leave (based on the daily wage rate in the last year of employment) in a lump-sum upon retirement. SCSD, like many districts, pays exactly 30%. Importantly, this lump-sum transfer counts as income in the year received, which often influences annual income (I) in the Annual Retirement Income calculation above.

To illustrate, consider an individual who retires in 2019, after 27 years of service with a masters degree. This individual fully qualifies for retirement, so they face no penalty and their last 3 years of income are \$58,340, \$59,769, and \$60,529 (See Figure DA1) . They receive the lump-sum payment for accrued sick days in the last year, when their daily wage rate is 60,529/187 $\approx$ \$323. Thus, their first year retirement income varies as follows with accrued sick leave:

- 0 days:
  - Lump Sum = 323*0*.3 = \$0
  - ARI = 27 * 0.025 * (58,340 + 59,769 + [60,529 + 0])/3 = \$40,153.35
- 50 days:
  - Lump Sum = 323*50*.3 = \$4,845
  - ARI: 27 * 0.025 * (58,340 + 59,769 + [60,529 + 4,845])/3 = \$41,283.68
- 100 days:
  - Lump Sum = 323*100*.3 = \$9,690
  - ARI: 27 * 0.025 * (58,340 + 59,769 + [60,529 + 9,690])/3 = \$42,373.80
- 200 days:
  - Lump Sum = 323*200*.3 = \$19,380
  - ARI: 27 * 0.025 * (58,340 + 59,769 + [60,529 + 19,380])/3 = \$44,554.05
- 300 days:
  - Lump Sum = 323*300*.3 = \$29,070
  - ARI: 27 * 0.025 * (58,340 + 59,769 + [60,529 + 29,070])/3 = \$46,734.30