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School tenure and student achievement

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ABSTRACT

While much empirical research concerns job tenure, this paper introduces the concept of school tenure and further examines whether and how school tenure impacts student outcomes using a rich set of cohort data from England’s secondary schools. Using the number of times a student switched schools during the academic year as an instrument to measure school tenure to fully account for endogeneity issues, the resulting two-stage least squares estimates suggest that the effects of school tenure are positive and heterogeneous across students. While advantaged students are more likely to gain when their own school tenure is longer, disadvantaged students benefit if their peers have longer tenure. This significant heterogeneous effect suggests that school tenure may not simply act as the inverse of school mobility but may represent a potential determinant of student achievement and an effective school-specific measure for policymakers and practitioners. The relevant implications are accordingly discussed.

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Introduction

While researchers have long been interested in the relationship between workers’ output and job tenure (how long a worker stays with a given firm), school tenure (how long a student stays in a given school) has received much less attention. Perhaps more surprising and interesting, although much of the literature has shown negative associations between moving schools and academic performance (e.g., Been, Ellen, Schwartz, Stiefel, & Weinstein, 2011; Clemens, Lalonde, & Sheesley, 2016; Evans, Yoo, & Sipple, 2017; Hanushek, Kain, Markman, & Rivkin, 2003; Hanushek, Kain, & Rivkin, 2004), there is very little understanding of how and to what extent school tenure affects student achievement. This paper emphasizes that although school tenure appears to be the inverse of school mobility, it is a new concept that deserves more attention. In principle, unlike school mobility, which often refers to study abroad or student transfer, school tenure is a direct indicator describing specific educational circumstances.

As noted in a previous study, “As students move from the elementary grades through the middle grades and onto high school, students perceive school climate
to be more negative, teacher support to be lower, and classroom environments to be less healthy” (Freiberg & Stein, 1999, p. 26). Therefore, the following questions arise: What impact does this perception have on student achievement? Why and how is school tenure relevant here? The logic is that several factors that largely determine students’ academic achievement, such as school culture and classroom disciplinary climate, also impact students’ school tenure. This new concept reflects multiple school-related dimensions, including teacher–student relations, school disciplinary climate, and school belonging – defined as “a sense of being accepted, valued, included, and encouraged by teachers and peers in school settings” (Liu & Lu, 2011, p. 187) – all of which have proven crucial for student achievement (e.g., Arens, Morin, & Watermann, 2015; Gillen-O’Neel & Fuligni, 2013; Hughes, Im, & Allee, 2015; Peterson, Rubie-Davies, Osborne, & Sibley, 2016; Rubie-Davies & Peterson, 2016; Thijs & Fleischmann, 2015). This feature enables policymakers and practitioners to employ school tenure as a convenient and effective measure for evaluating school and teacher performance and thereby for implementing policies and interventions that improve school climate and culture, enhance students’ sense of belonging to the school, and, in turn, increase their academic achievement. Based on an examination of the papers mentioned above, one can construct a comprehensive conceptual model to clarify the potential processes by which school climate or school belonging may impact students’ achievement. In this paper, a new perspective linking school tenure to these factors is used to develop the conceptualization of school tenure, which can be regarded as a potential determinant of student achievement and an effective school-specific measure for policymakers and practitioners.

In early work, Swanson and Schneider (1999) found that mobility early in high school in the United States context can lead to important long-term educational benefits, but they found no such positive effect for any type of mobility late in high school; in fact, their results actually imply positive school tenure effects on educational attainment. A recent longitudinal study showed that grade retention results in short-term benefits for the retained students, which could also be an implicit type of school-tenure effect (Klapproth et al., 2016). What could explain this effect? First, there are at least two reasons why pupils benefit from their own longer school tenure. (a) Similar to how we consider wage increases with job tenure to be evidence of firm-specific skills (Lazear, 2009), students staying at a particular school for a long time are also likely to obtain more school-specific skills than new arrivals are. These skills could be expected to raise performance and could include a better ability to use the school’s internet system to obtain useful learning material, knowledge about the type of questions a given teacher tends to ask in exams, and so forth. (b) As mentioned earlier, longer school tenure implies a stronger sense of school belonging and reflects one’s social adaptation, or “fitting in”, at school, including students’ emotional connection and identification with the academic institution and the people in that institution. School movers may lose ground in their academic progress due to the disruption of moving and may incur a loss because the social ties at their old institution lapse without immediately being replaced by new ones, whereas students with longer school tenure may enjoy more stable academic progress and stronger social support networks and may thus perform better.
Second, consistent with the negative externalities of moving reported by Hanushek et al. (2004) and Luppino (2015), school tenure may generate positive spillovers by reflecting a more stable class atmosphere in which teachers can employ more effective teaching styles and materials and deliver more efficient assistance and assessment; in such an environment, students tend to establish more stable social connections with their peers. Friendship and trust typically have positive effects on both individuals and the entire community (e.g., Bandiera, Barankay, & Rasul, 2005, 2009; Bandiera, Larcinese, & Rasul, 2010; Charness & Dufwenberg, 2006; Jackson & Schneider, 2011). These studies have reported that teachers can better identify students and more efficiently respond to their learning needs when the class size is small. Frequent changes in class composition can be expected to have an effect somewhat equivalent to increasing class size in this regard, because students’ performance might weaken if they receive less attention from the teacher and if the teacher is less familiar with each student. King (2016) found one reason that boys tend to show lower achievement than girls: Boys’ peer groups tend to exhibit more negative attitudes towards school and learning than girls’ peer groups do. This weak sense of school belonging of peer groups could shorten members’ school tenure and in turn harm their achievement. Taken together, the existing findings indicate that students’ achievement may be positively associated with their school tenure as well as that of their peers, ceteris paribus.

This paper has two main contributions to the existing literature: (a) It introduces a new education variable – school tenure – and thoroughly examines its impact on student outcomes. While it is evident that school mobility is costly to students, my results based on a large-scale dataset for England highlight that school tenure is not simply the inverse of mobility but rather represents an important measure of child development by allowing for student heterogeneity. Two-stage least squares estimates suggest that individual and peer school tenure tend to separately (significantly) impact different types of students: Non-White and/or low-income/high-deprivation students gain in educational attainment if their peers have longer school tenure, whereas female, high-income/low-deprivation, and high-achieving students score higher when they stay at a school longer. This heterogeneity of results across student characteristics suggests that school tenure could be a potential candidate for improving educational production function. (b) This paper offers empirical evidence of peer effects at the secondary school level. While much work has found peer effects on academic achievement in primary school (e.g., Ammermueller & Pischke, 2009; Elder & Lubotsky, 2009; Gould, Lavy, & Paseaman, 2009; Hanushek et al., 2003) and in college (e.g., Arcidiacono & Nicholson, 2005; Carrell, Fullerton, & West, 2009; Foster, 2006; Han & Li, 2009; Sacerdote, 2001), little evidence has been found for secondary schools (e.g., Black, Devereux, & Salvanes, 2013; Clark, 2010; Cullen, Jacob, & Levitt, 2005). Gaviria and Raphael (2001) found some peer effects on juvenile behaviour in high school but did not look for effects on test scores, and Clark (2009) suggested that peer effects on test scores may be weaker in high schools. In this paper, using a dataset from secondary schools in England, I report a heterogeneous effect of peers’ school tenure on students’ General Certificate of Secondary Education (GCSE) achievement – an informative indicator of education output and education spillovers over a student’s entire course of compulsory education in England (Appendix 1 Table A1 outlines the educational system in England).
The remainder of this paper is organized as follows: The following section describes the conceptual framework, and the subsequent section discusses the data. The “Methods and Empirical Results” section presents the methods and empirical results. Subsequently, a discussion is presented, followed by the conclusion of the paper.

**Conceptual framework**

**School moving during the academic year**

This paper adopts instrumental variable (IV) estimators to account for the observable endogeneity problem. We suspect that students’ own school tenure and that of their peers could be related to many factors other than those observed by researchers. As such, finding a useful instrument to measure endogenous school tenure becomes a priority. I used the number of students who moved schools during the academic year (i.e., excluding July, August, and September) as an instrument for school tenure by assuming that changing schools within the school year is more likely to be driven by random shocks than by parental choices. Lavy (2010) indicated that proper school choice has a number of merits for students, including significantly reducing the dropout rate and increasing the cognitive achievements of high school students. He also found that such choice improves behavioural outcomes such as teacher–student relations and students’ social acclimation and satisfaction at school. Thus, we believe that school choice is so important that a parent should be very cautious when making any moving decisions. As Been et al. (2011) also suggested,

> The involuntary moves precipitated by foreclosure may be even more harmful to students as choices may be limited by the urgency of the move. Students accordingly may move to poorer quality schools, with lower quality teachers or peers who are performing less well. (p. 408)

While a large body of literature (mostly in the US context) has shown that moving schools is often a sign of other factors that also impact school performance, inducing a classic omitted variable problem, my study should not be seriously contaminated by this issue for two reasons. (a) Unlike the US, which has especially high rates of residential mobility that can be partly attributed to a disproportionate percentage of low-income and/or single-parent families, England has relatively low mobility, income inequality, and social inequality. Thus, the number of moves during the term is presumed to be more exogenous and could serve as the desired instrument here. (b) The rich information available on personal and family backgrounds allows me to control for the characteristics most relevant to the association between school moving and school performance.

**Peer effects in an educational context**

In this paper, in addition to estimating the effects of one’s own school tenure, I also try to identify the peer effects of school tenure using idiosyncratic variation in peer tenure. While quantifying externalities in education will be of interest to policymakers, educators, and parents given student heterogeneity, it is generally difficult to distinguish among the various forms of social interaction. With Manski’s (2000) notation applied
to the educational context, three main types of effects serve as routes through which peers may impact students’ exam results. The first type is exogenous peer effects, which occur when test scores are correlated with peer characteristics; the second is endogenous peer effects, which suggest a learning effect among students whose performance is related to that of their peers; and the last is correlation effects for reasons that may be common within a group. For example, students in the same class often have the same teacher; thus, some teacher effects may be wrongly attributed to peers.

Methodologically, three main challenges are considered: common shocks, reflection problems, and sorting effects (Manski, 1993). Common shocks, such as school-level unobservables, should not be involved here because I focus on variation in ex ante peer characteristics; that is, school tenure precludes exam results. Likewise, the reflection problem is irrelevant here given the lack of simultaneous variables involved in my estimation. Finally, as Hanushek et al. (2004) indicated, long-term, non-pecuniary factors such as a preference for education and family stability that have important effects on achievement can substantially assist in eliminating sorting effects. Much recent research argues that parental involvement and support/attitudes towards education are particularly important determinants of academic achievement (e.g., Castro et al., 2015; Daniel, Wang, & Berthelsen, 2016; Diaconu-Gherasim & Măirean, 2016; Dinkelmann & Buff, 2016). The dataset employed here includes rich information on family background, particularly on parental aspirations and attitudes towards education, thereby helping to mitigate the sorting effects most likely to appear. In achieving this mitigation, this paper identifies purer peer effects than are found in other studies, with less bias.

**School tenure and other factors**

As mentioned in the introduction, school tenure reflects multiple school-related dimensions, including physical and psychological environments, leadership qualities of staff, and community relations, and thus should positively impact academic performance. Before moving further, it is worthwhile to discuss factors related to school tenure and examine how these factors relate to other factors in the research. The present study is built upon several research assumptions. (a) There is a positive relationship between school tenure and school climate and culture. School climate and culture involve internal characteristics that distinguish schools and influence members’ behaviours, shared values, and interpretations of social activities, which have been shown to affect student performance. For example, Cheema and Kitsantas (2014) showed that improvements in the disciplinary climate are associated with a reduction in the achievement gap. Students are likely to stay at a given school longer if they have enjoyable teacher–student relations, friendships, and a good school environment. (b) There is also a positive relationship between school tenure and students’ sense of school belonging. Freiberg, Huzinec, and Templeton (2009) created a programme that supported students in being “citizens” of the learning environment rather than merely “tourists”. In this programme, students are expected to take responsibility for their own actions and the actions of their peers. Feelings of school belonging associated with improved social engagement and/or learning engagement promote longer school tenure and vice versa. Thus, it is possible to understand how and why school tenure positively impacts student achievement via a channel that includes other factors.
Data

The Longitudinal Study of Young People in England (LSYPE) is an innovative large-scale panel study that commenced in 2004, when the young people constituting its sample were aged 13 to 14 years old. The survey used here consisted of four annual waves ending in 2007, when the participants turned 17 years old. Different modules were answered separately by the parents and their teenage children. I use only information provided by the “main parents” – those who asserted that they performed the bulk of childcare work. All sampled students were born between 1 September 1989 and 31 August 1990, meaning that they basically attended the same grade in the same academic year (given that very few students repeat or skip a grade in the UK; Crawford, Dearden, & Meghir, 2010; Devereux & Fan, 2011). A student’s peer group in this study is defined as all sampled students in that student’s grade in her school, excluding herself. The original sample drawn for the first wave of the LSYPE consisted of more than 33,000 young people in Year 9 attending maintained schools, independent schools, and pupil referral units (PRUs) in England in February 2004 (only approximately 4% of the final sample came from independent schools or referral units). Students excluded were youth educated solely at home, pupils in schools with fewer than a certain number of students (10 for maintained schools and 6 for independent schools), boarding school students, and youth residing in the UK solely for educational purposes. On average, 33.25 students were surveyed per school. Students from the main minority groups were oversampled to reach 1,000 for research purposes; other students were selected randomly from within the schools. Three education outcomes were extracted from the National Pupil Database by the LSYPE individual identifier: GCSE new style point scores (the new scoring system for the GCSE is in Appendix 1 Table A2), whether 5 or more GCSEs were achieved (Grades A*–C), and the number of GCSEs in each of three grade ranges (A*–A, A*–C, A*–G).

I reshaped the dataset to make it purely cross-sectional by averaging all variables over waves for each student (and her peers) because too many key variables were missing in the original. The result is approximately 14,000 observations. The inclusion of some boosts that included the 20% of schools with the most pupils in receipt of free school meals was meant to ensure adequate representation of the relevant subpopulation in England, and the personal weighting was used to eliminate bias in the estimates of population quantities. Figure 1 shows a histogram for the number of observations per school. The final sample contains an average of 22.65 students for each school due to attrition; only approximately 2% of schools have observations for more than 30 or fewer than 15 students.

Before the estimation is presented, it is helpful to clarify how school tenure was measured in this study. School tenure denotes how many years a pupil stays in a given secondary school. In England, pupils start secondary education when they turn 12; hence, the cohort studied in this paper entered secondary school in 2001. Knowing each student’s exact date of entry to their secondary school as of 2006, when they took the GCSE exams, enabled me to accurately calculate the number of months that each student stayed in his or her current school as of 2006. This number can be schematised as 66 – [(entry year − 2001) × 12 + entry month − 0.5]. The 0.5 figure means that a half
month was added to school tenure regardless of the date that students entered (i.e., nearer the start or end of the month), for simplicity. The maximum school tenure up to the GCSE exams was 57.5 months \((66 - (0 \times 12 + 9 - 0.5))\) for students who enrolled in school in September 2001. Figure 2 shows that more than 80% of pupils had the maximum school tenure: 57.5 months.

To ensure simplicity and to avoid loss of generality, I measured school tenure in years in the analysis. Figure 3 presents a randomly drawn 10% sample and illustrates the distribution of school tenure for individual youths and for their peers, showing that the mean school tenure is 4.7 years for both.

To ensure that all respondents in the study had the appropriate peer measures, missing values were dropped. Given that most missing values were from independent schools, the estimates should not suffer from sample attrition. The summary statistics are reported in Table 1. A description of the corresponding variables for peers is available upon request.
Methods and empirical results

*Ordinary least squares (OLS) estimates*

\[
Y_{is} = \beta_0 + \beta_1 TENURE_{is} + \beta_2 TENURE_{(-i)s} + \beta_3 X_{is} + \beta_4 X_{(-i)s} + \epsilon_{is} \tag{1}
\]

Equation (1) represents the OLS specification, where \( Y \) denotes educational outcomes for individual \( i \) in school \( s \): GCSE new style point scores, whether students achieved 5 or more high grades (A*–C) in the GCSE (a standard requirement for further education) and the number of GCSE achievements for each grade level (Grades A*–A, A*–C, and A*–G). \( TENURE_{is} \) and \( TENURE_{(-i)s} \) denote the average years of school tenure in school \( s \) for person \( i \) and that for her peers, respectively. \( X \) denotes a vector of control variables including female, White, UK born, young starter\(^3\), free meal eligibility, non-special education needs (SENs), Key Stage 2 point score\(^4\), income index, multiple deprivation index\(^5\), family size, number of siblings, whether the home is rented, single-parent family, and region of residence\(^6\), as well as the main parent’s (the child’s primary caretaker’s) age, education, ethnicity, social class status, employment status, aspirations, and attitude towards the child’s education. The GCSE point scores and the number of GCSE achievements for each grade level were divided by the standard deviation of students’ achievement to facilitate a comparison across different tests.

The results are presented in Table 2: Individual school tenure was significantly positively correlated with all GCSE exam measures, whereas pupils tended towards lower attainment if their peers had longer tenure. However, the OLS estimates above are likely to be biased for two reasons. First, there could be omitted variables: Figure A1 in Appendix 1 shows that students who moved during the school year were more likely to come from unstable families that did not own a house and that their parents were more likely to have changed jobs, divorced, or remarried. This finding is consistent with the results obtained by Fowler et al. (2015), indicating that although moves reflect voluntary and involuntary decisions, frequent mobility indicates economic strains that range from seeking affordability to the
Table 1. Summary statistics.

| Variable                                      | N     | Mean  | SD    |
|-----------------------------------------------|-------|-------|-------|
| **Individual Characteristics**                |       |       |       |
| School Tenure                                 | 14,180 | 4.437 | 0.843 |
| Number of Times Moved School during the Academic Year | 14,180 | 0.264 | 0.624 |
| Year of Birth                                 | 14,180 | 1989.677 | 0.468 |
| Month of Birth                                | 14,180 | 6.469 | 3.411 |
| Female                                        | 14,180 | 0.496 | 0.500 |
| White                                         | 14,180 | 0.671 | 0.470 |
| UK Born                                       | 13,858 | 0.926 | 0.262 |
| Young Starter                                 | 14,180 | 0.504 | 0.500 |
| Renting Status                                | 14,033 | 0.319 | 0.466 |
| Tercile Income Deprivation                    | 11,036 | 2.012 | 0.815 |
| Tercile Multiple Deprivation                  | 11,036 | 2.000 | 0.825 |
| Family Size                                   | 14,166 | 4.495 | 1.421 |
| Numbers of Siblings                           | 14,162 | 1.212 | 0.971 |
| Lone Parent Family                            | 14,159 | 0.303 | 0.460 |
| Free School Meal Eligibility                  | 14,107 | 0.172 | 0.377 |
| Non-Special Education Needs (SENs)            | 14,107 | 0.823 | 0.382 |
| Key Stage 2 Scores                            | 13,630 | 26.850 | 4.064 |
| Age of Main Parent                            | 14,180 | 43.114 | 5.823 |
| Education of Main Parent                      | 13,903 | 16.261 | 1.226 |
| White Main Parent                             | 14,139 | 0.702 | 0.456 |
| Social Class of Main Parent                   | 13,875 | 4.517 | 2.168 |
| Employment Status of Main Parent              | 14,113 | 3.544 | 3.044 |
| Aspiration on Child’s Higher Education        | 13,711 | 2.163 | 1.063 |
| Attitude to Child’s Education                 | 13,741 | 1.290 | 0.651 |
| Region of Residence                           | 12,379 | 5.326 | 2.411 |
| GCSE New Style Point Scores                   | 14,180 | 369.398 | 157.727 |
| Whether Achieved 5 or more GCSE (Grade A*-C)  | 14,180 | 0.580 | 0.494 |
| Numbers of GCSE (Grade A*-A)                  | 14,180 | 1.416 | 2.675 |
| Numbers of GCSE (Grade A*-C)                  | 14,180 | 5.756 | 4.263 |
| Numbers of GCSE (Grade A*-G)                  | 14,180 | 9.180 | 2.898 |
| **Peer Characteristics**                      |       |       |       |
| School Tenure                                 | 14,166 | 4.464 | 0.616 |
| Number of Times Moved School during the Academic Year | 14,166 | 0.256 | 0.198 |
| Number of Students per School                 | 8,484 | 22.65 |
| Number of Schools                             | 611   | 633   |

Table 2. OLS estimates of school tenure on youth GCSE achievements (robust standard errors in parentheses).

|                          | [1]                  | [2]                  | [3]                  | [4]                  | [5]                  |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                          | GCSE New Style       | 5 or more GCSE       | Num(GCSE)            | Num(GCSE)            | Num(GCSE)            |
|                          | Point Score          | (Grade A*-C)         | (Grade A*-A)         | (Grade A*-C)         | (Grade A*-G)         |
| Peers’ School Tenure     | -0.071*** (0.036)    | -0.037* (0.023)      | -0.026 (0.028)       | -0.041 (0.028)       | -0.106** (0.051)     |
| Individuals’ School      | 0.129*** (0.027)     | 0.059*** (0.017)     | 0.034** (0.016)      | 0.081*** (0.018)     | 0.159*** (0.039)     |
| Tenure                   |                      |                      |                      |                      |                      |
| Number of Schools        | 611                  | 611                  | 611                  | 611                  | 611                  |
| Observations             | 8,484                | 8,484                | 8,484                | 8,484                | 8,484                |

Notes: Probit model is used in Column 2, and OLS is used in the rest of the columns. All specifications also control for same individual and peer variables including female, White, UK born, young starter, free meal eligibility, non-special education needs (SENs), Key Stage 2 point score, renting status, income index, multiple deprivation index; main parent’s (who takes most care of child) age, education, ethnicity, social class status, employment status, aspiration on child’s education, attitude to child’s education, family size, number of siblings, lone parent family. A full set of dummies of region of residence is included. Robust standard errors in parentheses allow for clustering by school. All regressions are weighted by the personal weighting fully allowing for the sample design.

***p < 0.01. **p < 0.05. *p < 0.1.
chronic housing changes characteristic of less stable families. Although I included these variables in my specifications and I controlled for many more variables than have conventional studies on student achievement, it is still impossible to exhaustively control for all factors; the estimated effects of peers’ school tenure would also be spurious if teacher quality were omitted because people could mistakenly attribute the effect of teachers on test scores to peers. Second, peer groups could be endogenous – the high coefficient of correlation (0.75) between one’s own and peer school tenures somewhat implies that students may choose to attend the same school that their friends attend.

**Instrumental variables**

As mentioned above, the dataset contains detailed information on school switches, which, as the inverse of school tenure, serve as a natural instrument here. The number of times that students moved between schools (not in July, August, or September) was obtained from the students’ history files, which describe how frequently students changed schools during the school year by the end of Key Stage 3. As a result, people might expect the IVs to be better able to distinguish the effects of medium from long school tenure but less able to distinguish short from medium tenure, given that there was no further information for Key Stage 4. Figure 4 shows that most pupils never moved within the school term; among school movers, approximately 13% moved once, approximately 5% moved twice, and fewer than 1% moved more than twice.

Two attractive features of the switch variable made it a good instrument. First, unlike some instruments that entail only a weak relation with the endogenous variables, mobility was strongly linked to school tenure in that frequent switchers inevitably had shorter tenure. Hanushek et al. (2003) noted that changes in parental employment, parental earnings, and family structure may be the main drivers for student school changes. Figure A2(a) in Appendix 1 shows that moving during the school year always induces much shorter school tenure relative to “normal moving” (defined as either a move at the start of the school year or a normal transitioning to a new school) by parental employment status, house tenure, and family structure (whether parents ever divorced or remarried), confirming that midyear moving had a stronger relationship with school tenure and that this feature did not change based on the main factors thought to affect moving decisions.

![Figure 4](image_url). Number of times moved during school year.
Second, while mobility could be chosen by parents in normal circumstances (e.g., Hanushek et al., 2003) and would therefore not be perfectly orthogonal to unobservables, the unusual nature of the mobility variable used here to some extent breaks this endogenous linkage because the considerable difficulty of moving during the school year leads parents to avoid it unless unpredictable events occur (Hanushek et al., 2004). To illustrate, I found that while normal moving behaviour clearly varies across observed characteristics (family income, parental education, and particularly parental aspirations for the child’s education, which would drive parents to move up under the Tiebout model of mobility; Hanushek et al., 2004), there is no significant pattern discernible for my instrument in Figure A2(b) in Appendix 1. Students from low-income or high-aspiration families were clearly more likely to undergo normal switches; in contrast, moving within the term was rarely influenced by income or parental aspirations. This result supports the previous assumption that moving during the school year is less likely to be a choice-based variable.

However, in addition to showing that the instrument is largely unrelated to predetermined family background characteristics, it is also necessary to demonstrate that such moving behaviour is not driven by students’ previous school performance. If school movers are students who were expelled from their previous school, for instance, my instrument might not be valid because this group would differ in some significant ways from non-movers. To examine this possibility, Figure A2(c) in Appendix 1 illustrates the proportion of midyear movers by school performance, measured as contextual value-added scores (CVAs). The CVA is a statistic used by the government of the United Kingdom to assess school performance by taking into account the circumstances of children attending the school that are beyond the school’s control. I observed that students from the highest and lowest achievement levels were more likely to move schools than were students in the middle of the distribution. This finding suggests that midyear moving may not be systematically correlated with school achievement.

Although the comparisons shown do not necessarily prove that there is no correlation between moving and either observable or unobservable characteristics, the lack of a significant pattern for observables suggests that unobservable characteristics are also unlikely to be correlated with the instruments. This point is also relevant to the balancing tests in the next section.

**Balancing tests**

Unlike the conventional case with only one endogenous variable, two such variables are used in the balancing tests. Table A3 in Appendix 1 presents two balancing tests. The first regresses pre-determined individual characteristics on peer switching under the rationale that, conditional on other peer controls, peer switching behaviour should occur as if at random; that is, it should not be correlated with the individual pupil’s characteristics. The second balancing test regresses identical pre-determined characteristics for peers on individual switching to ascertain that, conditional on his or her own background, a pupil’s school moving is not driven by any characteristics of his or her peers. Reassuringly, both balancing tests in this case offer evidence that school moving appears to be a fairly accurate proxy for school tenure in that very few pre-determined variables for pupils (2 out of 20) or for their peers (4 out of 20) are significantly correlated with the corresponding moves and that none of them are significant at the 1% level.
Two-stage least squares (TSLS) estimates

Equations (2a) and (2b) present the first-stage estimates, in which a student’s own tenure is instrumented by the number of times the individual moved schools during the academic year and peer tenure is instrumented by the number of such changes for peers; then, Equation (3) presents the second-stage estimates, which use the two endogenous variables mentioned above. The equations are as follows (all variables are defined as in the OLS estimates):

\[
\text{TENURE}_{i} = \gamma_0 + \gamma_1 \text{SWITCH}_{is} + \gamma_2 X_{is} + \gamma_3 \tilde{X}_{(-i)is} + \mu_{is}
\]  

(2a)

\[
\text{TENURE}_{(-i)is} = \delta_0 + \delta_1 \text{SWITCH}_{(-i)is} + \delta_2 X_{is} + \delta_3 \tilde{X}_{(-i)is} + \nu_{is}
\]  

(2b)

\[
Y_{is} = \lambda_0 + \lambda_1 \text{TENURE}_{is} + \lambda_2 \text{TENURE}_{(-i)is} + \lambda_3 X_{is} + \lambda_4 \tilde{X}_{(-i)is} + \nu_{is},
\]

(3)

The first-stage estimates reported in Table 3 show that moving schools is a strong instrument for school tenure in both cases. A one-point increase in the rate of school moving during the school year reduces the pupil’s school tenure by .43 years, while the corresponding figure for peers is .3 years. The remaining TSLS estimates, however, illuminate a different picture for the effect of one’s own tenure and that of peers. Pupils benefited considerably from their own school tenure, in that the GCSE scores increased by approximately 11% of a standard deviation if the pupil stayed in the current school 1 year longer. Likewise, the number of GCSE marks (A*–G) achieved also increased by approximately 11% with a 1-year increase in school tenure, at the 10% significance level. These results are consistent with findings from the school moving literature (from an inverse perspective) and, more importantly, support the proposition that school tenure tends to benefit students in a similar manner as job tenure does workers. However, no peer effects were found, as no coefficients were statistically significant. Two preliminary findings are of note: (a) The change in the sign of most peer tenure coefficients in TSLS confirms the previous conjecture that the previous OLS estimates may be biased by endogeneity problems. To improve the precision of TSLS, I used dummies for moving once, twice, and more than twice and report the results in Table 3. The use of more instruments somewhat reduced the standard errors but unfortunately also weakened the first-stage results. Thus, I retain the initial instruments for the rest of the analysis. (b) The generally similar own-tenure effects found in TSLS imply that the bias of the OLS estimates for individuals is not as great as that for peers and further suggest that school tenure tends to benefit students similar to how job tenure benefits workers.

Heterogeneous effects

No peer tenure effects and some positive individual tenure effects were found for all students. In this section, I probe the heterogeneity of school tenure effects across students.

Gender

General statistics in education have shown that female students outperform males at different stages; this pattern persists even after controlling for students’ backgrounds
Black et al. (2013), Han and Li (2009), and Proud (2008) further found evidence that peer effects tend to vary across gender. It would therefore be of interest to determine whether gender differences exist here and how much these patterns relate to school tenure. Table 4 reports separate estimates for boys and girls. Despite the lack of effect of peer school tenure on achievement for either boys or girls, I did find that girls, compared with boys, gained greater benefits from their own school tenure; for example, a 1-year increase in school tenure generated a GCSE score increase of approximately 15% of a standard deviation for girls. Similarly, girls also tended to obtain more GCSE (A*-C) and (A*-G) achievements if they stayed in a given school longer. As Figlio (2007) found, while boys and girls alike suffer academically from the presence of disruptive classmates, boys are particularly prone to misbehave when their classmates are disruptive; with such misbehaviour, they benefit less from their own school tenure because classroom order is an important factor affecting student achievement (Gaskins, Herres, & Kobak, 2012). Thus, my results support the importance of looking beyond the concept of ability, in this case school tenure, as an effective approach to understanding why females generally have better school grades although male and female students have similar overall intelligence levels (Carvalho, 2016).

Descriptive statistics show that girls have starkly better academic records than boys, on average; this finding then suggests that higher achieving students are more likely to gain from their own tenure than lower achieving students are.

### Table 3. TSLS estimates of school tenure on youth GCSE achievements (robust standard errors in parentheses).

|                     | TSLS                                |
|---------------------|-------------------------------------|
|                     | FIRST STAGE                          |
|                     | GCSE New Style Point Score           |
|                     | S or more GCSE (Grade A*-C)         |
|                     | Num(GCSE (Grade A*-A))              |
|                     | Num(GCSE (Grade A*-C))              |
|                     | Num(GCSE (Grade A*-G))              |
| Peers’ School       |                                     |
| Tenure              | −.427*** (.137)                     |
| Individuals’ School |                                     |
| Tenure              | −.298*** (.023)                     |
| Number of Schools   | 611                                 |
| Observations        | 8,484                               |
| Peers Moved Once    | −.731*** (.281)                     |
| Peers Moved Twice   | −.372 (.425)                        |
| Peers Moved more than Twice | −1.483 (.929) |
| Peers’ School       |                                     |
| Tenure              | −.194*** (.031)                     |
| Individuals Moved   |                                     |
| Once                | −.743*** (.074)                     |
| Twice               | −1.085*** (.145)                    |
| Individuals Moved more than Twice | 1.19*** (.145) |
| Individuals’ School |                                     |
| Tenure              | .119*** (.044)                      |
| Number of Schools   | 611                                 |
| Observations        | 8,484                               |

Notes: See notes for Table 2 and text for details.

***p < 0.01. **p < 0.05. *p < 0.1.
Much of the literature has reported a racial/ethnic gap in achievement (e.g., Hughes et al., 2015; Kremer, Flower, Huang, & Vaughn, 2016; McDonough, 2015), and a recent study stated that US youth who reported higher ethnic-racial identity affirmation-belonging reported greater resistance to peer pressure to engage in problem behaviour (Derlan & Umaña-Taylor, 2015). As such, people might wonder whether White and non-White students are affected differently by their own tenure as well as by their peers’ school tenure. The main finding shown in Table 5 is that non-White students were more likely to gain from peers’ longer school tenure than White students were. A 1-year increase in peer tenure improved GCSE (A*–A) and GCSE (A*–C) achievement by 80% and 38% of a standard deviation, respectively, for non-White students, whereas White students see an increase of only 12% of a standard deviation in GCSE point scores with 1 additional year of their own school tenure. Marmaros and Sacerdote (2006) found that one of the key factors in forming friendships is race and that young people have less frequent interaction across than within racial groups. One possible explanation for this finding is that minority students are more motivated to socialize with people from similar backgrounds than non-minorities are, and building stronger ties with peers could plausibly result in stronger peer influence. The other major possibility that arises is that disadvantaged pupils are more sensitive to the composition of their peer group. Hanushek et al. (2004) found that the costs of switching schools appear to be greater for lower income students who attend higher turnover schools, while Gould et al. (2009) reported that disadvantaged students (who are disproportionately non-White) are more likely to be adversely affected by membership in their peer groups than non-disadvantaged students are. However, my results suggest that disadvantaged students are also more likely to be positively affected by positive peer characteristics. These findings are worth considering when multiculturalism is chosen as the foundation of immigration policies. Hoxby (2000) observed strong intra-race peer effects in US elementary schools; similarly, I found that minority students tended to be influenced by their minority peers, although the evidence of these effects is not detailed or conclusive.

Table 4. TLS estimates of school tenure on youth GCSE achievements by gender (robust standard errors in parentheses).

|        | **FIRST STAGE** | **GCSE New Style Point Score** | 5 or more GCSE (Grade A*–C) | Num(GCSE (Grade A*–A)) | Num(GCSE (Grade A*–C)) | Num(GCSE (Grade A*–G)) |
|--------|----------------|--------------------------------|-----------------------------|------------------------|------------------------|------------------------|
| Boys   |                 |                                |                             |                        |                        |                        |
| Peers’ School Tenure | −.537*** | .108                           | .148                        | .001                   | .126                   | .160                   |
| Tenure | (1.147)        | (1.164)                        | (1.142)                     | (1.152)                | (1.147)                | (1.263)                |
| Individuals’ School Tenure | −.287*** | .070                           | −.021                       | −.058                  | −.015                  | .076                   |
| Number of Schools | 555            | 555                            | 555                         | 555                    | 555                    | 555                    |
| Observations | 4,278           | 4,278                          | 4,278                       | 4,278                  | 4,278                  | 4,278                  |
| Girls  |                 |                                |                             |                        |                        |                        |
| Peers’ School Tenure | −.334** | −.180                          | −.090                       | −.034                  | .154                   | −.002                  |
| Tenure | (1.142)        | (1.252)                        | (1.179)                     | (1.275)                | (1.235)                | (1.314)                |
| Individuals’ School Tenure | −.312*** | .144**                         | .064                        | .126*                  | .096                   | .116*                  |
| Number of Schools | 574            | 574                            | 574                         | 574                    | 574                    | 574                    |
| Observations | 4,206           | 4,206                          | 4,206                       | 4,206                  | 4,206                  | 4,206                  |

Notes: See notes for Table 2 and text for details.

***p < 0.01. **p < 0.05. *p < 0.1.
Unlike Hanushek et al. (2004) and Gould et al. (2009), who investigated peer effects using rough income indicators such as “ever low income” (i.e., whether the pupil’s parents have ever had a low income) or “low socio-economic background”, the administrative index of income and multiple deprivations used here allows me to scrutinise whether the school tenure effect varies across student financial backgrounds. Tables 6 and 7 provide some interesting findings in this regard. First, compared to students from high-income or less deprived families, those with disadvantaged backgrounds were more likely to be positively impacted by peer school tenure: a 1-year increase in peer tenure increased the probability of GCSE achievement and the number of GCSEs (A*–C) achieved by 29% (or 27%) and 40% (or 42%) of a standard deviation for low-income (or highly deprived) students, which is consistent with the finding for non-Whites. These results reflect that ethnic minority and low-socioeconomic-status (SES) children are overrepresented among students at risk (for academic difficulties) and that they may experience a lower sense of school belonging while also being more responsive to variations in the level of school belonging relative to their higher achieving counterparts. Thus, disadvantaged students are more sensitive to their peers’ characteristics irrespective of whether the characteristics are positive or negative. Second, perhaps surprisingly, longer peer school tenure and own school tenure have different impacts on high-income or less deprived students. For example, a 1-year increase in peer tenure lowered GCSE achievement by approximately 1 point, whereas students’ own school tenure benefited them with a 30% increase in the number of GCSEs (A*–A) levels achieved. Regarding the own-tenure effect, this finding somewhat echoes the work of Lee (2016), who found a moderately strong relationship between attitude towards school and academic achievement only among students at the highest end of the SES spectrum. While Lee found this result slightly odd, as it contradicts the early study in which low-SES students further benefited from having positive attitudes towards school (e.g., Marjoribanks, 1987), a better explanation can be found here based on the school

### Table 5. TSLS estimates of school tenure on youth GCSE achievements by race (robust standard errors in parentheses).

|                          | FIRST STAGE | GCSE New Style Point Score | 5 or more GCSE (Grade A*–C) | Num(GCSE (Grade A*–A)) | Num(GCSE (Grade A*–C)) | Num(GCSE (Grade A*–G)) |
|--------------------------|-------------|----------------------------|-------------------------------|-----------------------|------------------------|------------------------|
| **White**                |             |                            |                               |                       |                        |                        |
| Peers’ School Tenure     | –.399***    | –.041                      | –.016                         | –.119                 | .139                   | .143                   |
| Individual’s School      |             |                            |                               |                       |                        |                        |
| Tenure                   | (.142)      | (.192)                     | (.147)                        | (.198)                | (.170)                 | (.285)                 |
| Number of Schools        | 558         | 558                        | 558                           | 558                   | 558                    | 558                    |
| Observations             | 6,234       | 6,234                      | 6,234                         | 6,234                 | 6,234                  | 6,234                  |
| **Non-White**            |             |                            |                               |                       |                        |                        |
| Peers’ School Tenure     | –.666***    | .184                       | .168                          | .806***               | .379*                  | –.264                  |
| Individual’s School      |             |                            |                               |                       |                        |                        |
| Tenure                   | (.152)      | (.200)                     | (.155)                        | (.259)                | (.197)                 | (.247)                 |
| Number of Schools        | 462         | 462                        | 462                           | 462                   | 462                    | 462                    |
| Observations             | 2,250       | 2,250                      | 2,250                         | 2,250                 | 2,250                  | 2,250                  |

Notes: See notes for Table 2 and text for details.

***p < 0.01. **p < 0.05. *p < 0.1.
### Table 6. TSLS estimates of school tenure on youth GCSE achievements by income index (robust standard errors in parentheses).

|                      | TSLS               | GCSE New Style Point Score | 5 or more GCSE (Grade A*–C) | Num(GCSE (Grade A*–A) | Num(GCSE (Grade A*–C)) | Num(GCSE (Grade A*–G)) |
|----------------------|--------------------|----------------------------|--------------------------------|------------------------|------------------------|------------------------|
| **Low Income**       |                    |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.694*** (.138)    | 307 (.160)                 | .296*** (.113)                 | .005 (.112)             | .400*** (.137)         | .465* (.246)           |
| Individuals’ School  | –.348*** (.045)    | .128* (.077)               | –.050 (.060)                   | .005 (.048)             | –.030 (.070)           | 211** (.105)           |
| Number of Schools    | 492                | 492                        | 492                            | 492                    | 492                    |                        |
| Observations         | 2,558              | 2,558                      | 2,558                          | 2,558                  | 2,558                  | 2,558                  |
| **Median Income**    |                    |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.491*** (.175)    | .226 (.195)                | .178 (.175)                    | .076 (.214)             | .191 (.188)            | .226 (.274)            |
| Individuals’ School  | –.324*** (.037)    | .042 (.072)                | .080 (.073)                    | –.066 (.077)            | .084 (.068)            | –.008 (.087)           |
| Number of Schools    | 556                | 556                        | 556                            | 556                    | 556                    |                        |
| Observations         | 2,919              | 2,919                      | 2,919                          | 2,919                  | 2,919                  | 2,919                  |
| **High Income**      |                    |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.214 (.161)       | –1.134** (.450)            | –.493** (.229)                 | –.278 (.490)            | –.461 (.410)           | –.907* (.483)          |
| Individuals’ School  | –.216*** (.028)    | .236** (.100)              | .065 (.072)                    | .303** (.145)           | .122 (.097)            | .161 (.112)            |
| Number of Schools    | 449                | 449                        | 449                            | 449                    | 449                    | 449                    |
| Observations         | 3,007              | 3,007                      | 3,007                          | 3,007                  | 3,007                  | 3,007                  |

Notes: See notes for Table 2 and text for details.
***p < 0.01. **p < 0.05. *p < 0.1.

### Table 7. TSLS estimates of school tenure on youth GCSE achievements by multiple deprivation index (robust standard errors in parentheses).

|                      | TSLS               | GCSE New Style Point Score | 5 or more GCSE (Grade A*–C) | Num(GCSE (Grade A*–A) | Num(GCSE (Grade A*–C)) | Num(GCSE (Grade A*–G)) |
|----------------------|--------------------|----------------------------|--------------------------------|------------------------|------------------------|------------------------|
| **High Deprivation** |                    |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.680*** (.134)    | .262 (.172)                | .273** (.124)                  | .138 (.117)             | .422*** (.142)         | .352 (.264)            |
| Individuals’ School  | –.366*** (.047)    | .070 (.079)                | –.037 (.062)                   | –.012 (.046)            | –.014 (.069)           | .087 (.110)            |
| Number of Schools    | 457                | 457                        | 457                            | 457                    | 457                    | 457                    |
| Observations         | 2,564              | 2,564                      | 2,564                          | 2,564                  | 2,564                  | 2,564                  |
| **Median Deprivation** |                  |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.498*** (.174)    | .308 (.207)                | .183 (.186)                    | –.212 (.223)            | .239 (.212)            | .523* (.280)           |
| Individuals’ School  | –.326*** (.036)    | .126* (.077)               | .100 (.079)                    | –.009 (.082)            | .067 (.072)            | .159* (.096)           |
| Number of Schools    | 537                | 537                        | 537                            | 537                    | 537                    | 537                    |
| Observations         | 2,788              | 2,788                      | 2,788                          | 2,788                  | 2,788                  | 2,788                  |
| **Low Deprivation**  |                    |                            |                                |                        |                        |                        |
| Peers’ School Tenure | –.247 (.178)       | –.898** (.398)             | –.339* (.185)                  | –.051 (.426)            | –.387 (.323)           | –.971** (.420)         |
| Individuals’ School  | –.216*** (.028)    | .162* (.099)               | .025 (.080)                    | .149 (.133)             | .105 (.093)            | .073 (.109)            |
| Number of Schools    | 408                | 408                        | 408                            | 408                    | 408                    | 408                    |
| Observations         | 3,132              | 3,132                      | 3,132                          | 3,132                  | 3,132                  | 3,132                  |

Notes: See notes for Table 2 and text for details.
***p < 0.01. **p < 0.05. *p < 0.1.
tenure perspective. That is, for high-income students, a positive attitude towards school stemmed from a longer school tenure, prompting increased achievement. By contrast, I found that negative peer tenure effects could be interpreted similar to the interpretation of job-tenure effects. In De Grip, Sauermann, and Sieben’s (2016) study, new hires benefited significantly from working with more experienced peers, especially during the first 3 months. By analogy, peers’ school tenure might have a diminishing, or even reverse, effect on individual performance, and this pattern would be more likely to emerge for more privileged students whose tenure-performance profile is steeper than that of their counterparts. Nevertheless, future investigation is needed here.

**Student’s previous achievement**

A large body of literature indicates that prior achievement is of great importance to academic success (e.g., De Koning, Loyens, Rikers, Smeets, & Van der Molen, 2012; Hughes et al., 2015). Although causal inferences cannot be made with the same certainty in observational studies as in randomized experiments, the inclusion of strong covariates, especially prior academic performance, can reduce the likelihood that associations are due to the influence of unobservables, including between-person variables that influence both achievement and school tenure. As discussed in the gender section, girls (who achieved higher scores than boys on average) tended to gain more from their own longer tenure. Following this line of evidence, I probed whether peer effects vary according to a student’s previous achievement. Table 8 reports these estimates, stratifying students into high-, medium-, and low-achievement groups by Key Stage 2 test scores. While students in the low- and medium-achievement groups were scarcely impacted by either their own or their peers’ school tenure, high-achieving students strikingly benefited from staying in a given school longer: Greater school tenure improved almost every GCSE exam measure. For example, the number of GCSE (A*-C) levels increased by 25% of a standard deviation with a 1-year increase in school tenure. Combining this finding with the findings by gender and by income/multiple deprivations, my results appear to indicate that students with privileged backgrounds (either high-achieving or high-income) are likely to benefit from their own longer school tenure.

**Further discussion**

As the empirical work above has shown, school tenure is more important than people have recognised. In this section, I further discuss some implications and significance.

**Implications for theory development**

School tenure could be an important measure for child development in educational and even psychological contexts. Given the strong heterogeneity effect found in this paper, a better understanding of school tenure is helpful when seeking insight into the development of individual differences in intrapersonal factors that may vary across related school variables. For instance, using GCSE mathematics grades, Tosto, Asbury, Mazzocco, Petrill, and Kovas (2016) found that perceptions of the classroom environment may indirectly influence achievement by boosting interest and self-concept. Likewise, tenure also helps support further understanding of school belonging, which is particularly strengthened by longer school tenure (Kuperminc, Darnell, & Alvarez-
In addition, school tenure may serve as a mediator linking to other underlying school issues. For example, Evans et al. (2010) found significant main and interactive effects of school building quality and student mobility on standardized test scores that occur independently of the socioeconomic and racial composition of the school. Been et al. (2011) studied how foreclosures in New York City affect mobility in public school students, showing that the full effect of moving schools on academic performance depends upon the impact on the moving students, the impact on their peers, as well as on the ability of the recipient schools to ameliorate the effects of foreclosure, mobility, and instability. In other words, a long school tenure in some sense implies student perceptions of a positive school climate, which fosters an atmosphere of mutual respect and therefore a willingness to engage with peers in ways that are productive for learning.

**Significance for policymakers and practitioners**

The results represent important findings in demonstrating that the relationship between students’ own (and peers’) school tenure and student achievement are differentially related to their gender, race, family income, and prior achievement. As stated, school tenure may be affected by many factors. As noted in a previous study, “School climate is mostly an affective or feeling element of learning; it has clear implications for achievement and academic well-being” (Freiberg, 1999, p. 10). The current study highlights the significance of school characteristics that reduce the relation between SES and achievement, so that equity in educational outcomes can be improved. Given that ethnic minority and low-income children tend
to be positively impacted by their peers’ school tenure, policymakers and educators should advocate and implement policies and interventions to improve school climate in order to create the premise for better instruction and learning and to influence the relation between SES and achievement (e.g., Gustafsson, Nilsen, & Hansen, 2016). Such a peer culture may be especially important for school belonging among ethnic minority youth. In practice, both teachers’ ratings and expectations along with parental involvement and support are highly influential for students across countries and regions in terms of ambition and the priority they place on learning and success (e.g., Chen, 2015; Friedrich, Flunger, Nagengast, Jonkmann, & Trautwein, 2015; Kaiser, Retelsdorf, Südkamp, & Möller, 2013; Lockl, Ebert, & Weinert, 2017; Nguon, 2012; Peter, Kloekcner, Dalbert, & Radant, 2012). Through consultation with teachers and parents, school psychologists can improve home–school partnerships and students’ school adjustment (Sheridan, Ryoo, Garbacz, Kunz, & Chumney, 2013). Furthermore, given that a strong positive effect of own tenure was found for all students, school reform focused on creating a culture of acceptance and respect should be effective in improving all students’ sense of school connection. Programmes aimed at welcoming new pupils into schools or families into neighbourhoods should be evaluated to determine the efficacy of such approaches in ameliorating the negative consequences of residential and school transition on educational quality, efficiency, and equity (Cueto, Guerrero, Sugimaru, & Zevallos, 2010).

When creating plans to improve academic achievement in schools, policymakers and administrators must analyse the school’s climate and culture, examine how they are affected by students’ misbehaviours occurring both on and off campus, and in turn explore how these misbehaviours affect their academic achievement. For instance, strong school cultures have more highly motivated teachers, who have greater success in terms of student performance and student outcomes. School principals seeking to improve student performance should focus on improving their school’s culture by ensuring the right relationships among themselves, teachers, students, and parents. The rationale underlying the relationship between school tenure and school climate is that improving the school climate should be a continuous process and a continuous effort, and such improvement can eventually lead to increased school tenure among students. Measuring school tenure and using these assessments to focus a school’s goals on learning is important for the process of improving the school’s academic performance.

Conclusions

This paper introduces a new concept, school tenure, which is defined as the number of years a given student has attended a particular school. Based on a large-scale dataset from schools in England, the TSLS estimates indicate a positive individual tenure effect but no peer tenure effect. Some interesting heterogeneous effects were also found – while more privileged students were more likely to gain from their own longer school tenure, students with disadvantaged backgrounds benefited from their peers having longer school tenure. My study emphasizes that the impact of school tenure may not only be the inverse of school mobility but also manifest as a potential determinant of student achievement and an effective school-specific measure for policymakers and practitioners. Knowing when moving is negatively associated with changes in the family context and children’s achievement or behaviour could assist in developing targeted policies and interventions to improve school climate and to achieve education equity.
Moreover, as a recent study from the UK indicated that school mobility is both directly and indirectly associated with an increased risk of psychotic-like symptoms (Singh, Winsper, Wolke, & Bryson, 2014), school tenure may be of potential importance beyond the educational context and may thus deserve further research attention.

Notes

1. In England, Year 11 is the 11th year after Reception and usually the final year of secondary school. The GCSE examinations are taken at the end of Year 11, when most students turn 16. Achieving a 5 or higher grade (A*–C) on the GCSE is a general requirement to further education (usually A-level study); students tend to leave the traditional education route at this point if they fail to achieve these grades.
2. Notably, due to this compromised cross-sectional dataset structure, this study lost power in dynamic dimensions, which may cause empirical issues.
3. Students were defined as young starters if they were younger than their sampled peers.
4. The Key Stage 2 point score has been achieved prior to secondary education, so it was not affected by school tenure during secondary school.
5. The income and deprivation index were both derived variables that were surveyed at the end of Key Stage 3.
6. The region of residence was entered only once, as I assumed that students in the same school lived in the same region.
7. Tiebout’s model is one in which each local community or jurisdiction provides a mix of public goods. Those who live in the jurisdiction receive the benefits of these goods and pay for them through a tax levied equally on each taxpayer. There are no interactions between jurisdictions. The key to Tiebout’s mechanism lies in the assumed mobility of people. If people can move from one jurisdiction to another without costs, they will move to the jurisdiction in which the combination of services and tax level provides them with the greatest net benefit.

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### Appendix 1. Background information

#### Table A1. Educational system in England.

| Age         | Year | Curriculum stage   | Schools                      |
|-------------|------|--------------------|------------------------------|
| 3–4         | 4–5  | Nursery school     | Nursery school               |
| 5–6         | 6–7  | Reception          | Infant school                |
| 7–8         | 8–9  | Year 1             | Key Stage 1                  |
| 9–10        | 10–11| Year 2             | Key Stage 2                  |
| 11–12       | 12–13| Year 3, 4         | Key Stage 3                  |
| 13–14       | 14–15| Year 5, 6         | Key Stage 4/ GCSE            |
| 15–16       | 16–17| Year 7, 8         | Sixth form/ International Baccalaureate or A level|
| 17–18       | (Lower Sixth) | Year 9           | Second school with sixth form |
|             | (Upper Sixth) | Year 10          | Upper school or High school   |

Source: Wikipedia.
Table A2. The new scoring system for GCSE.

| Grade | Old Points | New Points |
|-------|------------|------------|
| Level 2 | | |
| A* | 8 | 58 |
| A | 7 | 52 |
| B | 6 | 46 |
| C | 5 | 40 |
| Level 1 | | |
| D | 4 | 34 |
| E | 3 | 28 |
| F | 2 | 22 |
| G | 1 | 16 |

Source: Department for Education (DfES).

Table A3. Balancing tests for instrumental variables (robust standard errors in parentheses).

| Pre-determined Characteristics | Peers’ School Switch | Own School Switch |
|-------------------------------|----------------------|------------------|
| Female | .016 | .002 |
| White | .005 (.027) | .003 (.004) |
| Born in UK | –.018 (.017) | –.002 (.004) |
| Young Starter | .081 (.053) | .004** (.002) |
| Income Deprivation Distribution | –.037 (.041) | –.009 (.008) |
| Multiple Deprivation Distribution | –.082** (.040) | –.017** (.008) |
| Family Size | .078 (.093) | –.001 (.008) |
| Numbers of Siblings | .065 (.064) | –.002 (.005) |
| Lone Parent Family | –.012 (.033) | –.003 (.003) |
| Whether Taking Free Meal | .012 (.018) | –.001 (.003) |
| Non-Special Education Needs (SENS) | .005 (.023) | –.001 (.003) |
| Key Stage 2 Point Scores | –.068 (.330) | –.121* (.064) |
| Renting Status | .012 (.027) | .001 (.004) |
| Age of Main Parent | –.903** (.390) | –.036 (.037) |
| Education of Main Parent | .096 (.071) | .023* (.012) |
| Social Class of Main Parent | .163 (.116) | .002 (.017) |
| Employment Status of Main Parent | .023 (.015) | .009 (.020) |
| White Main Parent | .011 (.011) | .003 (.003) |

(Continued)
Table A3. (Continued).

|                                 | Peers’ School Switch | Own School Switch |
|---------------------------------|----------------------|-------------------|
|                                 | (.016)               | (.004)            |
| Aspiration on Child’s Higher Education | −.033 (.058)        | .007 (.009)       |
| Attitude to Child’s Education   | −.026 (.045)         | −.001 (.005)      |
| Number of Schools               | 611                  | 611               |
| Observations                    | 8,484                | 8,563             |

I regress pupil (or peer) pre-determined variables in each row on peer (or own) school switch and represent the coefficients from separate regressions of the relevant dependent variable in Columns 1 (or 2). For Column 1, peer controls include female, White, UK born, young starter, free meal eligibility, non-special education needs (SENs), Key Stage 2 point score, renting status, income index, multiple deprivation index; main parent’s (who takes most care of child) age, education, ethnicity, social class status, employment status, aspiration on child’s education, attitude to child’s education, family size, number of siblings, lone parent family, and region of residence. For Column 2, the same variables for pupils are used instead. See text for details.

Robust standard errors are adjusted for clustering at the school level. All regressions are weighted by the personal weighting fully allowing for the sample design.

***$p < 0.01$. **$p < 0.05$. *$p < 0.1$."

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Figure A1. Comparisons of movers and non-movers by family background.
Figure A2. (a) Individual year of school tenure by family backgrounds. (b). Proportion of school movers by family background. (c) Proportion of midyear movers.
Figure A2. (Continued).
Figure A2. (Continued).