Institute of Education

The Causal Impact of Transfers of Social Housing Stock on Educational Attainment in England

Bilal Nasim

Department of Quantitative Social Science
Working Paper No. 16-09
June 2016

Disclaimer

Any opinions expressed here are those of the author(s) and not those of the UCL Institute of Education. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

DoQSS Workings Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

Department of Quantitative Social Science, UCL Institute of Education, University College London,
20 Bedford Way, London WC1H 0AL, UK

The Causal Impact of Transfers of Social Housing Stock on Educational Attainment in England

Bilal Nasim[1]

Abstract

Between 1997 and 2008, approximately one million social housing dwellings in England were voluntarily transferred from local authority to housing association ownership. In exchange, housing associations were committed to managing, renewing and regenerating the stock of housing under their control. This paper is the first to investigate the impact of these large scale voluntary transfers (LSVTs) of social housing stock on the educational attainment of pupils. To address issues of endogeneity, I employ both a Difference-in-differences and a Difference-in-difference-in-differences approach. In London local authorities, LSVTs improved the average educational outcomes of pupils aged between 14 and 16 by approximately 1% and the outcomes of free school meal pupils aged between 14 and 16 by between 1% and 3.5%. The positive impact of LSVTs was smaller and less robust across Metropolitan local authorities, and there was no impact of LSVTs in Unitary local authorities. I find little or no improvement in the age 7 and 11 educational outcomes of pupils in local authorities which had conducted LSVTs. Overall, the results suggest that the LSVTs, and subsequent regeneration, of social housing stock improved the educational outcomes of pupils in London but not elsewhere

JEL codes: I21, I28
Keywords: Educational attainment; Social housing; Transfers

Contact Details: Bilal Nasim (b.nasim@ioe.ac.uk) Department of Quantitative Social Science, Institute of Education, University of London, 20 Bedford Way London, WC1H 0AL

[1] Department of Quantitative Social Science, Institute of Education, University College London, 20 Bedford Way, London WC1H 0AL
(b.nasim@ioe.ac.uk)

1 Introduction

The post World War II consensus in England was one which viewed the State as having a legitimate role as a direct provider of housing. Social housing was considered a right of citizenship and preferable to private landlordism (Lee, 2002). The Conservative Government elected in 1979 sought to shift this perspective to one which preferred social housing to be provided only for the most disadvantaged of society. Extending home ownership and reducing state provision on housing were priorities throughout the 1980s, first through the Right to Buy and later via transfers of tenanted social housing stock. This shift in emphasis led to a “residualisation of social housing”, lowering its status and increasing stigma (Forrest and Murie, 1990; Forrest and Murie, 1983).

Having enabled local authorities to undertake voluntary transfers of tenanted stock to other landlords in the 1985 Housing Act, in 1988 the Conservative Government established Housing Action Trusts (HATs), non-departmental public bodies, designed to focus resources and redevelop some of the poorest and most disadvantaged council estates. Social housing tenants were also granted powers to initiate transfers of their homes to alternative landlords, referred to as ‘Tenants’ Choice’. However tenants were reluctant to change landlords. They were hesitant to allow private landlords and property speculators to adopt ownership of their homes and estates, particularly in light of the initial refusal by Government to accommodate ballots of tenants on HAT proposals (Lee, 2002; Woodward, 1991). Nevertheless HATs and Tenants Choice did provide the modeling framework for LSVTs of social housing stock. Local authorities, having to adapt to the changes in policy perspective toward social housing provision, were interested in exploring ways of involving the private sector whilst retaining tenant protection and participation opportunities (Malpass and Mullins, 2002). Local authorities, during the late 1980s and early 1990s, began developing their own models of LSVTs which were gradually accepted by government and implemented. The models entailed transferring stock to a single landlord, usually a newly created Housing Association (HA), governed by a group of trustees comprising representatives of the funders, local authority and tenants, with the transfer involving prerequisite tenant ballots. Between 1988 and 1997 88% of transfers completed were whole stock transfers to single landlords. Transfers during this period took place mostly in smaller, shire (rural) counties, often in Conservative control, with higher stock values and lower debt. Between 1992 and 1997 75% of all English transfers were in “rural prosperous” local authorities (Pawson et al, 2009). Overall, however, despite interest by local authorities and the policy measures introduced during this period, the number and rate of transfers of housing stock remained low.

A number of factors led to a considerable increase in LSVTs by local authorities in the late 1990s and beyond. Between 1989 and 1995 new financial requirements greatly tightened local authorities' finances and as a result many more started to consider transfers. The introduction of the Estates Renewal Challenge Fund (ECRF) further incentivised LSVTs by facilitating transfers in local authorities with low or even negative value housing stock (Wilcox and Joseph Rowntree Foundation, 1994). As a result, inner urban areas began considering transfers of their housing stock. The ECRF also helped to establish new and deeper partnerships between local authorities and housing associations as well as the idea that urban, Labour led local authorities could gain from stock transfers. Further, in 1999 the Labour Government made available grants to local authorities to redeem overhanging debts, where the received capital receipt from transfer was smaller than the outstanding debt in their Housing Revenue Account (HRA), the existence of which had previously prohibited local authorities from considering transfer. This change in policy made feasible much larger, city-wide transfers. The Decent Homes Standard initially introduced in 2000 required that all social housing be of a decent standard by 2010 and transfers were increasingly seen as a key device to facilitate large scale investment in previously under maintained council housing. Since 1997 transfers of housing stock have increasingly featured larger local authorities, often involving areas of urban stress and estates characterised by social deprivation. Between 1997 and 2007 LSVTs in urban areas accounted for 50% of the total, whilst being almost entirely absent in the first ten years of stock transfer. More broadly, the post-1997 transfers account for 75% of all transferred homes since 1988 (see Figure 1). These post-1997 transfers are referred to as 'second generation' LSVTs "on the basis that they have taken place within a policy context substantially distinct from that within which earlier transfers were undertaken" (Pawson et al. [14]).

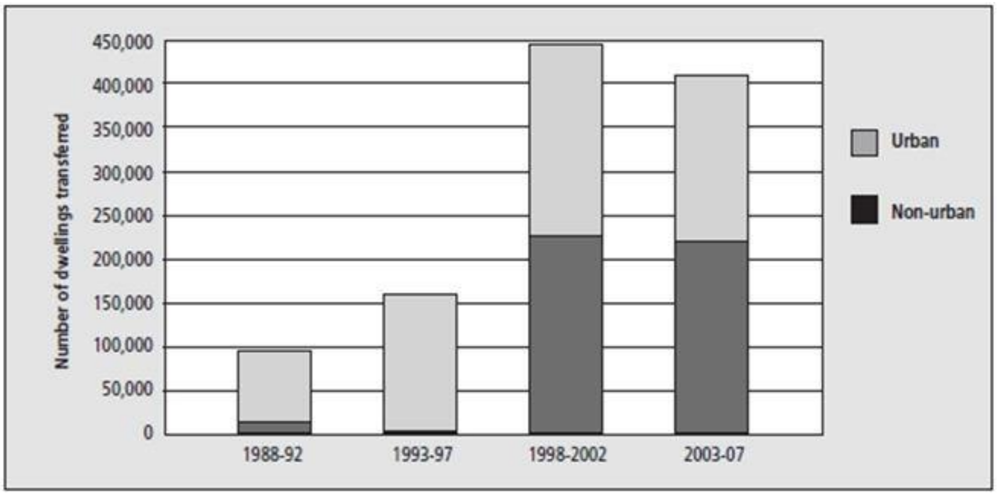

Figure 1: Stock transfers in England - trend over time by local authority type. Taken from Pawson et al, 2009. Source: CLG stock transfers database.

In this paper I evaluate the impact on the educational outcomes of pupils living in areas which experienced second generation LSVTs. To my knowledge, the impact of LSVTs on the educational outcomes of pupils has not been investigated. I first compare the pupil educational outcomes in local authority districts (LADs) which had conducted LSVTs, 'experimental' authorities, with the outcomes of pupils in LADs which had not, 'non-experimental' authorities, using a Difference-in-differences strategy. I address the possibility of unobserved differences across pupils and authorities, and also account for possible differences in time-trends between experimental and non-experimental local authorities. This identification strategy is still not ideal, firstly due to the possible presence of shocks contemporaneous with the LSVT timing which may partially determine local authority level educational outcomes, and secondly, due to the relatively small proportion of pupils at the local authority level that reside in social housing and are thus directly subject to the LSVT. Without knowing the housing tenure of each pupil the impact of the LSVT on educational out- comes is the average effect across all pupils in the experimental local authority, which, given that approximately one fifth of pupils are in social housing, will temper the size and statistical significance of the estimates. I thus employ a Difference-in-difference-in-differences approach exploiting pupil-level information on free school meal eligibility to construct the additional difference. This mitigates the influence of contemporaneous shocks. In addition, one would expect free school meal pupils to be more likely to be living in social housing than a pupil selected at random within the local authority and thus more likely to have been directly affected by an LSVT[2].

[2] As far as I am aware, there is no data available on the correlation between social housing tenure and free school meal eligibility.

I find LSVTs improved local authority level educational outcomes of pupils aged between 14 and 16 by approximately 1% and the outcomes of free school meal pupils aged between 14 and 16 by between 1-3.5%. I find little or no improvement in the age 7 and 11 educational outcomes of pupils who had experienced an LSVT.

There are two important considerations regarding the generalisability of these results; firstly they are found primarily for London LADs, and secondly, there are significant restrictions to the sample of local authorities ultimately included in the analysis (outlined in section 3). Thus caution is required when interpreting these findings. It is also beyond the scope of this paper to empirically examine possible mechanisms (described in section 2.2) giving rise to the estimated impact of LSVTs. Data containing disaggregated HA expenditures over the time period covered by the analysis in this paper, is, in principle, available, and this presents a natural extension of this study.

The paper is organised as follows: The remainder of the Introduction details the implementation of LSVTs and the possible mechanisms mediating the relationship between the LSVTs and educational outcomes. Section 2 presents the methodology and Section 3 summarises the data. The results are presented in Section 4 and discussed in Section 5, and I conclude in Section 6.

2 Background

2.1 Large Scale Voluntary Transfers in England

LSVTs of social housing stock are undertaken at the LAD level in England. There are four broad LAD types, metropolitan districts, London boroughs, unitary authorities and non-metropolitan (shire) districts. The first two types are predominantly urban, relatively densely populated areas. Unitary authorities are comprised of both urban and rural areas while non-metropolitan districts are the most numerous and largely rural. The functions and powers of these districts are similar across types, with all four having autonomy over housing decisions. A significant distinction between London LADs and the other three LAD types is that London LADs conducting LSVTs often did so as partial transfers of social housing stock rather than whole transfers. Partial LSVTs were much less common across the other three LAD types. London LADs tended to prefer repeated partial transfers due the very high debt levels in the HRA of London LADs and the relatively high proportion of total dwellings allocated for social housing. These partial transfers were often highly targeted at the most deprived estates. This meant that the London LSVTs represented a smaller proportion of the total number of dwellings, and were often one of a number of partial transfers conducted by the LAD over time.

To secure ministerial consent for LSVTs, LADs were required to provide evidence of tenant support for the transfer[3]. To secure a majority tenant vote, without which the LSVT could not take place, the LADs developed a set of transfer commitments against which the successor Housing Association (HA) would be held accountable[4]. In order to convince tenants to vote for the transfer, LADs had to provide sufficient incentives to the tenants whilst avoiding over-ambitious pledges, which may have lacked credibility, and/or, in the event that tenant consent was obtained, feasibility. To fund the expenditure associated with the transfer commitments, HAs largely raised capital in private finance markets, and were not-for-profit, such that any trading surplus was used to maintain existing housing and help finance new homes.

These transfer commitments almost always encompassed the following (Pawson et al, 2009);

- Investment in repairs and modernisation: Typically including installing double-glazed windows, energy efficient central heating and modern bathrooms and kitchens, electrical re-wiring, and improving security.
- Housing management: Consisting of pledges related to improving repairs services, for example, introducing repairs appointment systems and/or higher repairs standards and tackling anti-social behaviour, sometimes involving dedicated anti-social behaviour units.
- Regeneration: The majority of LADs and successor HAs provided regeneration pledges, relating to the construction of new dwellings, and more loosely, commitments to promote employment and training opportunities and address 'quality of life issues'
- Enhanced tenant involvement: As standard, this included having tenants on the board of the successor HA, and often also involved the promotion and funding for tenants' associations, the establishment of tenant panels or committees, and the collection of customer feedback via tenant surveys.
- Rent guarantees: Typically in the form of rent pledges relating to rent increases for the first five years after the LSVT. Usually, but not

[3] This was not a legal requirement but rather the customary way in which tenant consent was demonstrated.
[4] Has are independent, not-for-profit organisations raising capital in private finance markets. Their legal status, however, has been contested on a number of occasions. Has are generally considered as private entities in that they are not owned or directly controlled by the state. This has been legally challenged, for different reasons, by the European Union in 2004 and the United Kingdom High Court in 2008.

always, this involved limiting annual rent changes to the retail price index plus 1 - 1.5%.

Evidence on the delivery by transfer HAs on their commitments suggests that most ballot promises had been honored (Pawson et al, 2009). A postal survey of second-generation transfer HAs suggests that instances where ballot promises have been exceeded have vastly outnumbered cases where pledges have remained undelivered or delayed (see Figure 2). Between 1998 and 2008 almost £20 billion of funding has been generated to facilitate the transfer promises on property repairs and area modernisation. Generally, LSVTs in urban LADs have been significantly more costly compared with rural LADs typically reflecting a poorer condition of properties in urban transferred stock. It is not within the scope of this paper to exploit LAD-specific HA expenditure facilitating transfer commitments in investigating the causal impact of LSVTs, but this represents a natural extension of this work which I discuss later in the paper, and an area I hope to explore in future work.

	No promise made	Promise...					Total respondents
		...not met	...delayed	...on schedule	...fully met	...exceeded	
Catch-up repairs	2	0	0	8	24	13	47
Other property modernisation	0	0	0	12	13	22	47
Other works	4	0	1	14	17	10	46
Improved housing repairs service	4	0	0	13	20	10	47
Other housing services	4	0	0	7	23	11	45
Rent guarantee – existing tenants	1	0	0	7	32	7	47
Rent guarantee – new tenants	5	1	0	6	30	4	46
Enhanced tenant participation	2	0	1	6	21	17	47
Development	13	1	3	9	5	13	44
Local regeneration	16	0	0	8	11	10	45

Figure 2: Delivery against transfer promises - overview from transfer HAs. Taken from Pawson et al, 2009. Source: Postal survey of second generation transfer HAs.

2.2 Large Scale Voluntary Transfers and Educational Attainment

It is clear from the transfer pledges outlined above, that there are two possible mechanisms via which LSVTs improve the educational outcomes of pupils; housing quality effects and neighbourhood effects.

Successful delivery on transfer commitments pertaining to investment in repairs, modernisation and housing management, as detailed above, constitutes an improvement in housing quality. Housing quality could affect the educational outcomes of young people in the residence directly, and/or indirectly via affecting parents or siblings in ways which are significant in determining the young persons educational outcomes. Research conducted on the direct impact of housing quality on child/young person outcomes suggests poor housing quality is associated with worse child socio-emotional health conditional on household income, parental education and mental health, and child's gender (Gifford and Lacombe, 2006). There is also an extensive literature in Epidemiology showing robust associations between housing quality and a variety of child health outcomes including respiratory health and asthma (Andriessen et al, 1998; Strachan and Carey, 1995). Thus to the extent that a pupils educational outcomes are determined by their mental and physical health, one might expect housing quality to be associated with educational outcomes. It is worth noting however that none of these studies identify causal associations. Further, they provide evidence from different countries, using different samples and estimation techniques. The analysis in this paper does not add to this particular body of evidence, and can say nothing to the question of causality in the association between housing quality and child outcomes. Nevertheless, to the extent to which housing quality does causally modify childhood development, it can be seen as a potential mechanism via which LSVTs affect pupil educational outcomes.

There is also some evidence to support an indirect relationship between housing quality and child educational outcomes via parents. Poor quality housing, defined as homes with leaking roofs, broken windows, rodents, non-functioning heating, exposed wiring and unsafe environments, are found to be associated with children's emotional and behavioural well-being, with much of the association operating through parental stress and parenting behaviours (Coley et al, 2013). Further, as with child health outcomes, there is a vast literature on the effect of housing quality on adult health outcomes. Epidemiological research has found significant associations between indicators of housing quality[5] and asthma and chest problems (Barton et al, 2007; Jacobs et al, 2009), long-standing illness and disability (Blackburn et al, 2010), blood pressure (Jacobs et al, 2009) and self-reported health (Kahlmeier et al, 2001), although again none of the studies identify causal relationships. To the extent that these associations are causal, however, poor housing quality may impact on child educational outcomes via impacting upon the health of parents, and subsequently, their ability and capacity to parent.

Successful delivery on transfer commitments pertaining to tackling anti-social behaviour in the neighbourhood and area regeneration constitutes an improvement in the quality of the neighbourhood, the second possible mechanism. Sociological and Epidemiological theory suggest four broad

[5] These include indicators for damp and mould, living and bedroom temperatures, overcrowding, pest problems, water leaks and mothers' satisfaction with the home.

channels through which a pupil's neighbourhood can impact on child outcomes (Glaster, 2012; Ellen and Turner, 1997);

- Social interactive.
  - Socialisation by adults: The influence of role models as reference points for behaviour, the strength of local social norms and the extent of a collective presence and community within the neighbourhood.
  - Peer influences: The existence of positive/negative peer pressure, the importance of relative position and relative status, reference points for behaviour amongst peers and the availability of extra-curricular activities and engagement.
  - Social networks: The interpersonal communication of information and resources of various kinds transmitted through neighbours.
- Environmental.
  - Exposure to crime and violence.
  - Physical surroundings: Neighbourhoods may exhibit deteriorated structures and public neighbourhood infrastructure as well as exposure to toxic air, soil and/or water.
- Geographical.
  - Physical distance and isolation: The proximity to and accessibility of economic opportunities in addition to transport and mobility infrastructures more broadly.
- Institutional.
  - Local institutional resources: The availability and quality of schools, nurseries and medical centers.
  - Local market actors: The prevalence of certain private market actors such as off licenses, fast food restaurants and betting stores in addition to the existence and scale of local illegal drug markets.

Successfully delivering on the transfer commitments of mitigating anti-social behaviour and redeveloping and regenerating the local area most relates to the social interactive and particularly environmental channels. Increased tenant participation and engagement with neighbourhood issues and development as a result of a transfer commitment relates closely with the socialisation by adults channel above, in particular the influence of adult role models and the strengthening of a collective community presence. Local area and infrastructure regeneration may include increased availability and use of extra-curricular activities (peer influences channel) and reduce risks associated with exposure to dangerous environments (physical surroundings channel), both of which could conceivably affect educational outcomes. The common transfer commitment to mitigate anti-social behaviour could also conceivably improve educational outcomes via one or more of the social interactive channels[6]. This paper cannot add to the literature examining the impact of neighbourhood quality on child development, but to the extent to which neighbourhood quality impacts on child development, improvements in the quality of the neighbourhood represents a potential mechanism via which LSVTs affect child educational outcomes.

3 Methodology

My aim is to identify the causal impact of the LSVT of social housing stock on educational outcomes. The first approach is to employ a Difference-in-differences (DD) analysis. I initially conduct two balancing tests to check that the experimental and non-experimental groups of LADs are broadly comparable, where experimental LADs are defined as those which ever conducted an LSVT within the analysis window. The first of these is a t-test of the differences in baseline pupil outcomes and LAD characteristics between the two groups[7]. The second is a regression of a binary indicator for an experimental LAD on baseline pupil outcomes and LAD characteristics to determine if baseline LAD descriptors jointly predict experimental LAD status.

Equation (1) represents the first DD specification, where *i*, *d*, and *t* denote an individual pupil, LAD, and year, respectively, with errors clustered at the LAD level and pupil-level characteristics, X_{idt}, included in all specifications. An indicator for an LAD being an experimental LAD is included, denoted by Exp_{dt}[8]. No information is available on the housing tenure of the pupil, thus y_{idt} denotes the outcome for pupil *i* in LAD *d* in year *t*.

$$y_{idt} = \beta_0 + \beta_1\tau_t + \beta_2 Exp_{dt} + \beta_3 LSVT_{dt} + \beta_4 X_{idt} + u_{dt} \quad (1)$$

The fact that the LSVTs do not all occur in the same year across LADs has a number of implications for the data structure and the treatment variable, $LSVT_{dt}$. There is no common 'before-after' period across LADs.

---

[6] A comprehensive review of the evidence on each of these channels is provided in Glaster, 2010.

[7] Baseline pupil outcomes and LAD characteristics are taken from the year 2001, which is a year prior to the first LSVT in the estimation sample.

[8] Given that experimental LADs are defined as those which ever conducted an LSVT within the analysis window, if the LAD is an experiemental LAD, the indicator, Exp_{dt}, will equal 1 for all *t*. Thus the indicator does not vary across *t* within LAD.

τ_t is thus equal to the calendar year. Given the variation in the timing of the LSVTs across LADs, the LSVT treatment variable is defined in two ways. The first LSVT treatment variable is defined as an LAD-specific 'before-after' binary variable. This binary treatment, *LSVT Bin*, is equal to '1' for experimental LADs in years after the earliest LSVT, and '0' for experimental LADs in the year of, or in the years before the first LSVT, and for non-experimental LADs[9].

The second, *LSVT Prop*, is equal to the cumulative proportion of dwellings in the LAD transferred as part of the LSVT, for each year in the LAD-specific 'after' period. For the majority of experimental LADs, which conducted only one LSVT, this means that for each year of the LAD-specific 'after' period, *LSVT Prop* is equal to the proportion of dwellings transferred during the first and only LSVT. For the LADs that conducted two partial LSVTs in different years, *LSVT Prop* is equal to the proportion of dwellings transferred during the first LSVT for each year in the 'after' period between the first and second LSVT, and then the sum of the proportions of dwellings transferred in the first two LSVTs for each year in the 'after' period after the second LSVT, and so on for LADs that conducted three or more LSVTs within the time frame analysed. *LSVT Prop*, in addition to capturing variation in treatment across experimental and non-experimental LADs, captures variation in treatment intensity within experimental LADs.

The DD estimate is captured by the parameter β_3 with the treated group consisting of all pupils in experimental LADs. A second DD specification includes unrestricted LAD fixed effects, (η_d). Both of the DD specifications require the identifying assumption that the experimental and non-experimental LAD groups experience parallel trends in the outcomes prior to the LSVT treatment. To address this, particularly in light of the variation in the treatment timing across experimental LADs, the final DD specification also allows for an experimental LAD-specific time-trend, $Exp_{dt} \times t$, estimating the following;

$$\begin{aligned} y_{idt} = \beta_0 + \beta_1\tau_t + \beta_2 Exp_{dt} + \beta_3 LSVT_{dt} + \beta_4 X_{idt} \\ + \beta_5\eta_d + \beta_6(Exp_{dt} \times t) + u_{dt} \quad (2) \end{aligned}$$

There are two issues to note. Firstly, equation (2) requires the identifying assumption that the experimental LADs did not experience shocks to child

[9] The year of the LSVT is defined as part of the 'before' period due to the time taken by Has to fulfill their transfer commitments after acquiring the dwellings in the LST and, as a result, the low likelihood of any potential effects of the housing and neighbourhood regeneration being transmitted within the same year.

outcomes which were contemporaneous with the LAD-specific ‘after’ period.

Secondly, the treated group in equations (1) and (2) are all pupils in experimental LADs. β_3 thus captures an average effect of the LSVT treatment for all pupils in social housing and not in social housing in experimental LADs. However, based on the mechanisms described in Section 1.3 one would expect any causal association between the LSVT and pupil outcomes to be larger for pupils who are directly subject to the transfer of housing stock, that is, pupils in social housing, particularly those actually residing in the dwellings transferred. Only a minority of pupils are in social housing, approximately 20%. To this extent, β_3 represents an underestimate of the impact of an LSVT on pupils subject to the LSVT.

I address both of these issues by exploiting the pupil-level data available to perform a Difference-in-difference-in-differences (DDD) estimation, using information on the free school meal eligibility (FSM) status of pupils. Eligibility for both social housing and free school meals is based on the level of socio-economic disadvantage[10]. The nationwide proportion of children with FSM status is very similar, at approximately 20%, to the proportion of children in social housing. Thus despite not having pupil-level information on housing tenure, this suggests that the treated households in the DDD model are likely to be more strongly correlated with the households subject to the LSVT than are the treated households in the DD model.

The DDD framework also mitigates any bias resulting from potential contemporaneous shocks to outcomes by comparing the outcomes of FSM and non-FSM pupils within LADs. I estimate the following model, again with errors clustered at the LAD level;

$$\begin{aligned} y_{idt} = \beta_0 + \beta_1\tau_t + \beta_2 Exp_{dt} + \beta_3 LSVT_{dt} + \beta_4 X_{idt} \\ + \beta_5\eta_d + \beta_6(Exp_{dt} \times t) + \beta_7 f_{idt} + \beta_8(f_{idt} \times t) \\ + \beta_9(f_{idt} \times Exp_{dt}) + \beta_{10}(f_{idt} \times LSVT_{dt}) + u_{dt} \quad (3) \end{aligned}$$

where f_{idt} represents an indicator for the FSM status of pupil *i* in LAD *d* in year *t*. The time-invariant characteristics of the new treatment group,

[10] The measure of disadvantage determining the eligibility for social housing is primarily based on income, household composition and prior housing conditions. Free school meal eligibility is determined by whether the parent receives one of the following support payments; Income Support, Income-based Jobseekers Allowance, Income-related Employment and Support Allowance, Support under Part VI of the Immigration and Asylum Act, 1999, State Pension Credit (conditional), Child Tax Credit (conditional), and Working Tax Credit run-on, paid for 4 weeks after you stop qualifying for Working Tax Credit.

FSM pupils in experimental LADs, are captured by β_7. Changes over time in the treated group across all LADs and time-invariant differences in the treated group between experimental and non-experimental LADs are captured by β_8 and β_9, respectively. β_{10} represents the DDD estimate, and captures all variation in pupil educational outcomes specific to the treated (FSM) group relative to the controls (non-FSM), in the experimental LADs relative to the non-experimental LADs, in the years after treatment relative to the years before. Again, the model is estimated for both the binary and proportional versions of the treatment variable.

It is worth noting that unbiased estimation of β_{10} in equation (3) requires a further assumption; there are no contemporaneous shocks affecting the educational outcomes of FSM and non-FSM pupils differentially, specific to either experimental or non-experimental LADs. It is possible that LAD-specific shocks may occur which differentially impact on FSM and non-FSM pupils, however this differential effect would have to also vary across experimental and non-experimental LADs to bias the estimate of β_{10}. There is no a priori reason to believe this could have been the case, and the balancing tests suggest that the experimental and non-experimental LADs ultimately used in the analysis are very similar in observables.

Finally, to ensure that any estimated effects in both the DD and DDD specifications are not being driven by changes in the LAD-specific composition of pupils over time, I compare the past educational outcomes (Key Stage achievement) of pupils moving out of a given LAD with those moving in, for each year, and separately by experimental and non-experimental LADs. Generally, there were very few differences in the past educational outcomes of movers into and out of LADs in a given year, and this was found to be true for pupils in general, and FSM pupils specifically. This suggests that any significant effects of the LSVTs on educational outcomes are not being driven by changes in the composition of pupils over time at the LAD level.

4 Data

4.1 Transfers

Data on the LSVTs are from the Homes and Communities Agency (HCA). The HCA provide data on all completed LSVTs which includes, for each LSVT, the LAD involved, the date of transfer and the number of dwellings transferred[11]. There are four LAD types defined using the old 4-digit ONS

[11] Information is also available on the Housing Association involved in t he LSVT, percentage turnout and percentage yes votes for the tenant ballot, the gross transfer price and loan facilities valuation, none of which are required for the analysis in this paper.

coding system; London Boroughs (Lon Bor), Metropolitan (Met), Unitary Authorities (UA) and Non-metropolitan (Non-met). The total number of dwellings (and the number of social housing dwellings) in each LAD is taken from annual ONS administrative data and is used to create the proportional LSVT treatment variable, *LSVT Prop*.

4.2 Pupils

The pupil outcomes are taken from the National Pupil Database (NPD). The national curriculum in England consists of a series of assessments, Key Stages, for children attending maintained schools. They comprise of a mixture of test-based and teacher-led assessment depending on the age of the child. Key Stage 3 tests are in English, Maths and Science, taken at age 14. National Key Stage 3 tests were abolished in 2008, a year within the time period under analysis in this paper. For this reason I include only the teacher assessed scores for the three Key Stage 3 subjects as they are available for all of the years in the estimation sample. Key Stage 4 represents two years of school education, incorporating GCSE's and other exams taken at age 16. Subject specific point scores are available for Key Stage 3. For Key Stage 4, however, due to the number of subjects taken by pupils, I derive both an (uncapped) average points score measure defined as total points divided by the number of GCSE's or equivalents and a binary measure indicating whether the pupil achieved five or more A to C grades.

Information on the FSM status of the pupil required for the DDD analysis is taken from the Pupil Level Annual School Census (PLASC). The pupils' gender, month of birth and ethnicity are also taken from PLASC to use as controls in the analysis.

4.3 Local Authority Districts

To perform the balancing tests I use two sets of LAD characteristics from 2001 in addition to the baseline pupil outcomes from PLASC in 2001. The first set is taken from the 2001 Census and is the LAD-level rates of unemployment, no qualifications, lone parenthood, social housing tenure, ethnicity and poor health. To this I add the LAD-level rates of pupils with FSM status taken from PLASC. The second set of baseline LAD characteristics measure LAD expenditure and contains per capita total capital and revenue expenditures and those for education related services only. This is from the Department for Communities and Local Government (DCLG).

4.4 Estimation Sample

I impose a number of restrictions on both the years which the analysis covers and the group of LADs I ultimately include in the estimation sample.

The first is a result of local government reorganisation. The second generation of transfers took place between 1997 and 2012. During this time there were two periods of local government reorganisation; between 1996 to 1998, and in 2009. The bulk of this restructuring involved converting approximately 24 Shire Counties and their respective sub-districts into newly created Unitary Authorities (UA), each consisting of new UA districts. Given that I am exploiting variation across LADs in both the DD and DDD analyses and given the scale of the reorganisation carried out in the two periods, I therefore initially restrict the analysis to the period between 1999 and 2008, within which no local government reorganisation took place. Secondly, PLASC, which provides the FSM information for each pupil is available only from years 2001 to 2009. The analysis is thus further restricted to the years between 2001 and 2008.

Figure 3 charts the 254 LSVTs conducted, by LAD-type, between 1988 and 2012, where the number of dwellings transferred are represented by the size of the circle. The reference lines at year 2001 and 2009 (dashed) represent the window of analysis based on the first restriction imposed by local government reorganisation. The PLASC data restriction reduces the window by one year, represented by the two unbroken reference lines at years 2001 and 2008. LSVTs conducted outside of this window are not considered in the analysis.

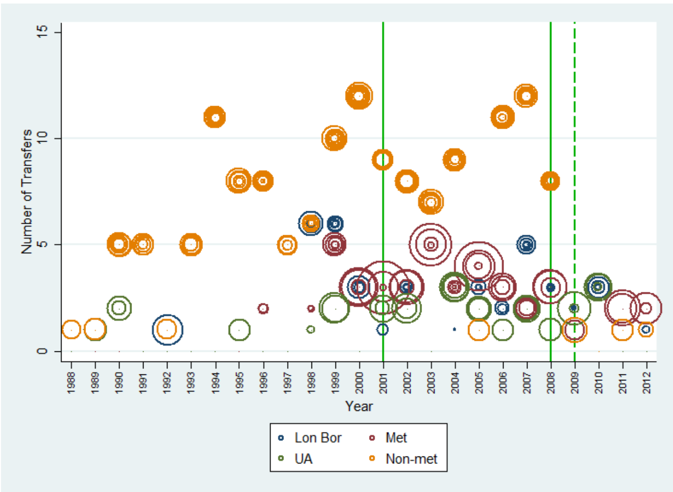

Figure 3: LSVTs between 1988 and 2012 including window of analysis between 2001 and 2008, inclusive.

The top half of Table 1 shows that within my window of analysis there were 376 LADs, 102 of which were experimental, i.e conducted LSVTs between 2001 and 2008. A number of LADs, however, conducted multiple LSVTs over time. Thus, experimental LADs which also conducted LSVTs prior to 2001 may confound any estimated relationship between LSVTs and pupil outcomes insofar as effects of prior LSVTs remain into 2001 and beyond. I therefore restrict the sample to those LADs which never conduct an LSVT prior to 2001. This restriction reduces the total and experimental number of LADs from 376 and 102 in the *Analysis Window* sample, to 272 and 89, respectively, in the final estimation sample, *Est*. These 89 experimental LADs conducted 91 LSVTs between 2001 and 2008. The final four columns shows the *Est* sample by LAD type.

Table 1: Estimation Sample - LSVT Description

Sample			Est			
	Analysis Window: All LADs	Est	Lon Bor	Met	UA	Non-met
Number of LADs	376	272	21	28	39	184
Experimental LADs	102	89	5	10	13	61
Number of LSVTs	122	91	6	11	13	61
Mean Number of Dwellings Transferred	5570	6035	1620	16293	8029	4196
Mean Proportion of Social Housing Dwellings Stock	0.47	0.58	0.1	0.51	0.59	0.65
Mean Proportion of Total Dwellings Stock	0.09	0.11	0.02	0.15	0.13	0.11

[1] Experimental (Non-experimental) LADs are defined as those that did (did not) conduct an LSVT in any year within the window of analysis, between 2001 and 2008.

[2] Sample *Analysis Window* includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[3] Sample *Est* restricts sample *Analysis Window* to those LADs which did not conduct an LSVT prior to 2001.

The bottom half of Table 1 describes the average number of dwellings transferred per LSVT and the mean proportion of LAD social housing stock and LAD total dwellings stock that these transferred dwellings represented. From *Est* it can be seen that just over 6000 dwellings were transferred in each LSVT, constituting just over half the pre-existing social housing stock and a tenth of the total dwellings in the LAD. By LAD type, the number of transferred dwellings ranges from 1620 to 16293, constituting between a tenth and two-thirds of the social housing stock and between 2% and 15% of the total dwellings stock in the LAD. As was discussed in Section 1, the London Borough LSVTs were partial transfers which tended to involve smaller segments of housing stock, and this is reflected in Table 1 with only 10% of the social housing stock on average being transferred as part of the LSVT, accounting for approximately 2% of the total number of dwellings in the LAD on average.

5 Results

Table 2 shows the results of the first balancing test, comparing the baseline (2001) characteristics of the experimental and non-experimental LADs. I collapse the data by LAD and perform a t-test of the difference in the means of each baseline indicator between the two groups (non-experimental less experimental) and present this difference and its significance level. In the estimation sample, *Est*, Table 2 suggests that there are statistically significant differences in the 2001 proportions of children in social housing between experimental and non-experimental LADs. When the four LAD types are considered separately, however, it can be seen that only in the Non-met group are there statistically significant differences between experimental and non-experimental LADs. These are observed in the 2001 unemployment rate, lone parenthood prevalence, proportion of children in social housing and the total capital expenditure by the LAD. No differences are present in any of the LAD types in Key Stage outcomes.

Table 2: Comparison of the Baseline Characteristics of Experimental and Non-experimental LADs In Estimation Sample and by LAD Type

			Est							
Sample	Est		Lon Bor		Met		UA		Non-met	
	t-test	Obs	t-test	Obs	t-test	Obs	t-test	Obs	t-test	Obs
Baseline - 2001 Indicators										
KS4										
Average Point Score	-0.09	263	-0.22	21	0.06	28	-0.02	39	-0.11	175
Five A-C	-0.02	263	-0.06	21	0.01	28	0.01	39	-0.03	175
KS3										
English TA	-0.19	257	-0.22	21	-0.03	28	-0.06	39	-0.23	169
Maths TA	-0.34	257	-0.83	21	0.46	28	-0.06	39	-0.39	169
Science TA	-0.32	257	-0.99	21	0.38	28	0.08	39	-0.36	169
LAD Characteristics										
Ethnic	0.03	226	0.09	21	0.01	28	0.05	39	0.01	138
Unemployed	0.01	226	0.01	21	-0.01	28	-0.01	39	0.01*	138
Lone Parent	0.01	226	-0.01	21	-0.01	28	-0.01	39	0.01*	138
No Qualifications	-0.01	226	-0.04	21	0.01	28	-0.03	39	0.01	138
Poor Health	0	226	-0.01	21	0	28	0.01	39	-0.01	138
FSM	0.01	226	0.09	21	-0.03	28	-0.01	39	0.01	138
Social Housing	0.02**	226	0.04	21	0.01	28	-0.01	39	0.02**	138
LAD Expenditures										
Cap Exp - Education	0	226	0.01	21	-0.01	28	-0.01	39	.	.
Cap Exp - Total	0.09	226	0.73	21	-0.01	28	0.01	39	0.02**	138
Rev Exp - Education	0.02	226	-0.02	21	-0.03	28	-0.04	39	.	.
Rev Exp - Total	0.17	226	1.02	21	-0.03	28	-0.03	39	0.04	138

[1] t-test of the difference in the means of each of the baseline indicators in the left column between experimental and non-experimental LADs. In the t-test column I present the value of the difference in the means between the two groups (non-experimental - experimental) and its' significance level; * significant at 10%, ** significant at 5% and *** significant at 1%.

[2] Experimental (Non-experimental) LADs are defined as those that did (did not) conduct an LSVT in any year within the window of analysis, between 2001 and 2008.

[3] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[4] Both baseline outcomes and LAD characteristics are LAD-level 2001 means.

Table 3 shows the results of the second balancing test. I separately test the significance of the baseline LAD-level Key Stage outcomes, socio-economic characteristics and expenditures in predicting subsequent experimental LAD status. Within each of these three sets of baseline indicators I test the joint significance of the components[12] using a Wald test, with a chi-squared distribution. In the estimation sample as a whole, the 2001 Key Stage outcomes and LAD characteristics do not significantly predict subsequent experimental LAD status, whereas LAD expenditures do. Again when this analysis is conducted separately by LAD type, it can be seen that the significance of LAD expenditures is driven by the Non-met group, with the other LAD types exhibiting no joint significance of LAD expenditures in predicting experimental status. Non-met experimental LADs are also predicted jointly by the LAD characteristics.

Table 3: Predicting Experimental LAD with Baseline LAD-level Indicators for Estimation Sample and by LAD Type

Sample		Es			
	Est	Lon Bor	Met	UA	Non-met
Baseline - 2001 Indicators					
KS4	x	x	x	x	x
KS3	x	x	x	x	x
Chi-sq(5)	4.53	3.12	5.39	1.43	4.73
LAD	x	x	x	x	x
Chi-sq(7)	10.88	2.72	4.64	5.12	10.21*
LAD Expenditures	x	x	x	x	x
Chi-sq(4)	8.69*	3.04	2.84	4.31	8.66**

[1] Chi-squared statistics are presented along with their significance levels. * significant at 10%, ** significant at 5% and *** significant at 1%.
[2] Three Chi-squared statistics are reported. One for each set of baseline indicators.
[3] Experimental (Non-experimental) LADs are defined as those that did (did not) conduct an LSVT in any year within the window of analysis, between 2001 and 2008.
[4] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

The balancing tests suggest that Non-met experimental LADs are observably different to Non-met non-experimental LADs, implying the possible presence of unobservable differences. I therefore exclude Non-met LADs entirely from the subsequent analysis.

[12] Due to the number of components in each set of baseline indicators, the defrees of freedom restrictions mean that it is not possible to test the joint significance of all three sets of baseline indicators from the same prediction regression for all of the LAD types.

5.1 Difference-in-differences

Tables 4 and 5 present the DD results for the Key Stage 3 and 4 outcomes, respectively, based on equation (2) with controls for pupil-level characteristics, LAD fixed effects and an experimental LAD-specific time trend. *LSVT Bin* and *LSVT Prop* represent the binary and proportional versions of the DD treatment variable as defined in Section 2.

Table 4: Difference-in-differences: KS3

DD - KS3				
Sample		Est by LAD Type		
	Est	Lon Bor	Met	UA
English TA Lev				
LSVT Bin	0.041	0.171	0.148	-0.033
	[0.104]	[0.193]	[0.156]	[0.185]
Obs	1687156	349257	713376	624523
R-squared	0.07	0.08	0.07	0.08
LSVT Prop	-0.006	17.951	0.727	-0.064
	[0.714]	[3.183]***	[0.790]	[1.253]
Obs	1687156	349257	713376	624523
R-squared	0.07	0.08	0.07	0.07
Maths TA Lev				
LSVT Bin	0.014	0.338	-0.021	0.035
	[0.110]	[0.199]*	[0.215]	[0.105]
Obs	1696324	351371	717183	627770
R-squared	0.05	0.08	0.04	0.05
LSVT Prop	-0.344	18.879	-0.833	0.925
	[0.804]	[5.784]***	[1.194]	[0.750]
Obs	1696324	351371	717183	627770
R-squared	0.05	0.08	0.04	0.05
Science TA Lev				
LSVT Bin	0.037	0.041	0.085	0.079
	[0.111]	[0.114]	[0.189]	[0.213]
Obs	1696844	350982	717873	627989
R-squared	0.05	0.06	0.04	0.05
LSVT Prop	-0.135	8.657	-0.261	0.541
	[0.794]	[3.904]**	[1.143]	[1.241]
Obs	1696844	350982	717873	627989
R-squared	0.05	0.06	0.04	0.05
Controls				
Pupil	x	x	x	x
LAD FE	x	x	x	x
Exp*Linear Time	x	x	x	x

[1] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[2] Non-met LADs are excluded from the analysis.

[3] LSVT Bin is a binary variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an

Ex- perimental LAD, and equal to 1 if the year is after the LSVT year of an Experimental LAD.

[4] LSVT Prop is a continuous variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experi- mental LAD, and equal to the proportion of total dwellings transferred during the LSVT if the year is after the LSVT year of an Experimental LAD.

[5] Pupil characteristics include gender, month of birth and ethnicity, LAD FE refers to LAD fixed effects and Exp*Linear Time represents the in- clusion of an experimental LAD-specific time trend.

[6] * significant at 10%, ** significant at 5% and *** significant at 1%.

Table 5: Difference-in-differences: KS4

DD - KS4 Sample		Est by LAD Type		
	Est	Lon Bor	Met	UA
Average Point Score	0.009	-0.001	0.021	0.119
	[0.016]	[0.025]	[0.021]	[0.038]
Obs	1772947	343426	754933	654588
R-squared	0.07	0.09	0.06	0.07
LSVT Prop	0.221	2.534	0.292	0.156
	[0.125]*	[0.641]***	[0.107]**	[0.289]
Obs	177294	343426	754933	654588
R-squared	0.07	0.09	0.06	0.07
Five A-C				
LSVT Bin	0.009	-0.015	0.001	0.011
	[0.016]	[0.012]	[0.008]	[0.013]
Obs	1826068	372594	778090	675384
R-squared	0.07	0.05	0.03	0.04
LSVT Prop	0.039	0.281	0.073	0.042
	[0.045]	[0.149]*	[0.049]	[0.086]
Obs	1826068	372594	778090	675384
R-squared	0.04	0.05	0.03	0.04
Controls				
Pupil	x	x	x	x
LAD FE	x	x	x	x
Exp*Linear Time	x	x	x	x

[1] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[2] Non-met LADs are excluded from the analysis.

[3] LSVT Bin is a binary variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experimental LAD, and equal to 1 if the year is after the LSVT year of an Experimental LAD.

[4] LSVT Prop is a continuous variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experimental LAD, and equal to the proportion of total dwellings transferred during the LSVT if the year is after the LSVT year of an Experimental LAD.

[5] Pupil characteristics include gender, month of birth and ethnicity, LAD FE refers to LAD fixed effects and Exp*Linear Time represents the inclusion of an experimental LAD-specific time trend.

[6] * significant at 10%, ** significant at 5% and *** significant at 1%.

Let us first consider the DD estimates for KS3 outcomes in Table 4. When conducting the analysis on the estimation sample as a whole, *Est*, no impact of the LSVT treatment on any of the Key Stage 3 outcomes is found, for either the binary or proportional versions of the treatment. However, conducting the analysis separately by LAD type suggests that this is not true across LAD types. For Lon Bor, the DD estimates using the proportional treatment, *LSVT Prop*, for all three teacher-assessed subjects are positive and statistically significant, corresponding to increases of 1% for English and Maths and 0.5% for Science[13]. The binary treatment *LSVT Bin* is also significantly associated with Maths, also corresponding to increase of 1%.

Table 5 presents the DD estimates for KS4 outcomes. The DD estimates on *LSVT Prop* in the Lon Bor sample are significant for both the KS4 average point score and five A-C outcome measures. A coefficient of 2.534 for KS4 APS and 0.281 for KS4 Five A-C correspond to 1% and 0.5% of their respective LAD averages, suggesting that LSVTs conducted in the London Boroughs improved the LAD-level APS and Five A-C average by 1% and 0.5%, respectively, for all pupils. A significant treatment effect is also found with *LSVT Prop* in the Met sample for the APS outcome, with an effect size of 1.2%.

The DD estimates overall suggest that the LSVTs conducted in Lon Bor had a modest but statistically significant positive impact on both the average KS3 and KS4 outcomes of pupils in the LAD. KS4 APS improvements are also seen in the Met LADs sample. LSVTs conducted in UA LADs appear to have no impact on the LAD-level averages in any of the outcomes.

5.2 Difference-in-difference-in-differences

The DDD estimates are based on equation (3) and are presented in Tables 6 and 7. As discussed in Section 2, the DDD analysis provides a more robust identification of the treatment effect than the DD analysis by mitigating the confounding effects of possible contemporaneous shocks to pupil outcomes. The treatment group is now FSM pupils in the LAD only, rather than all pupils.

Table 6 estimates suggest that LSVTs have improved the teacher-assessed

[13] I calculate the effect sizes with the following formula; $ES_{ls} = (DD_{ls}/(1/P_l))/M_{ls}$; where l denotes one of the four LAD types and s denotes the subject. DD_{ls} represents the DD coefficient for LAD type l in subject s, P_l represents the average proportion of total dwellings transferred in the LSVT in LAD type l and M_{ls} represents the mean outcome score for LAD type l in subject s.

KS3 outcomes of FSM pupils in Lon Bor. The DDD estimates using the proportional treatment variable for English (20.688), Maths (26.194) and Science (25.424) are all significant at the 5% level, and correspond to increases of 1.3%, 1.6% and 1.6%, respectively[14].

Table 6: Difference-in-difference-in-differences: KS3

DDD - KS3 Sample		Est1		
	Est1	Lon Bor	Met	UA
Eng TA Lev				
LSVT Bin	0.091	0.285	0.114	0.163
	[0.125]	[0.286]	[0.193]	[0.154]
Obs	1687009	349222	713341	624446
R-squared	0.12	0.12	0.13	0.12
LSVT Prop	-0.323	20.688	0.021	0.923
	[0.629]	[9.477]**	[0.564]	[1.053]
Obs	1687009	349222	713341	624446
R-squared	0.12	0.12	0.13	0.12
Mat TA Lev				
LSVT Bin	0.219	0.162	0.349	0.329
	[0.158]	[0.356]	[0.231]	[0.243]
Obs	1696175	351332	717150	627693
R-squared	0.1	0.12	0.11	0.09
LSVT Prop	0.622	26.194	1.516	1.818
	[0.891]	[8.486]***	[0.846]*	[1.647]
Obs	1696175	351332	717150	627693
R-squared	0.1	0.12	0.11	0.09
Sci TA Lev				
LSVT Bin	0.141	0.216	0.276	0.148
	[0.139]	[0.293]	[0.188]	[0.225]
Obs	1696695	350943	717841	627911
R-squared	0.1	0.11	0.1	0.1
LSVT Prop	0.042	25.424	1.152	0.141
	[0.753]	[9.912]**	[0.637]*	[1.570]
Obs	1696695	350943	717841	627911
R-squared	0.01	0.11	0.1	0.1
Controls				
Pupil	x	x	x	x
LAD FE	x	x	x	x
Exp*Linear Time	x	x	x	x

[1] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[2] Non-met LADs are excluded from the analysis.

[14] For the DDD analysis, effect sizes are calculated with the following formula; $ES_{fls} = (DDD_{fls}/(1/P_l))/M_{fls}$; where f represents FSM pupils, l denotes one of the four LAD types and s denotes the subject. DDD_{fls} represents the DDD coefficient for FSM pupils in LAD type l in subject s, P_l represents the average proportion of total dwellings transferred in the LSVT in LAD type l and M_{fls} represents the mean outcome score for FSM pupils in LAD type l in subject s.

[3] LSVT Bin is a binary variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experi- mental LAD or if the pupil is not FSM-eligible, and equal to 1 if the pupil is FSM-eligible and the year is after the LSVT year of an Experimental LAD.
[4] LSVT Prop is a continuous variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Ex- perimental LAD or if the pupil is not FSM-eligible, and equal to the proportion of total dwellings transferred during the LSVT if the pupil is FSM-eligible and the year is after the LSVT year of an Experimental LAD.
[5] Pupil characteristics include gender, month of birth and ethnicity, LAD FE refers to LAD fixed effects and Exp*Linear Time represents the in- clusion of an experimental LAD-specific time trend.
[6] * significant at 10%, ** significant at 5% and *** significant at 1%.

There is also evidence of LSVTs affecting the KS3 Maths and Science outcomes of FSM pupils in Met LADs; both DDD estimates using the proportional treatment variable, 1.516 for Maths and 1.152 for Science, are significant at the 10% level and correspond to increases of 0.8% and 0.7%, respectively.

Table 7 presents the DDD estimates for the two KS4 outcomes. LSVTs appear to have impacted the outcomes of FSM pupils in Lon Bor. Using the proportional treatment variable, the coefficient of 7.008, significant at the 10% level, corresponds to a 3.5% increase in the average point score of FSM pupils. For the five A-C measure, the DDD estimate of 1.509 for London Boroughs corresponds to a 2.9% increase in the proportion of FSM pupils obtaining five A-C grades. The DDD estimate for Met LADs is also significant for the average point score outcome, with the coefficient of 0.311 equivalent to an increase of 1.7%.

The DDD estimates suggest that LSVTs in Lon Bor have had an independent impact on the Key Stage 3 and 4 outcomes of FSM pupils. All three KS3 outcomes at age 14 for FSM children in Lon Bor are improved by the LSVTs by between 1.3% and 1.6%. And age 16 FSM pupils experience a 3.5% increase in their average points scores as a result of the LSVTs and almost a 3% higher likelihood of obtaining at least five A-C grades at KS4. Modest but statistically significant associations with KS3 and KS4 outcomes of FSM pupils are also present in Met LADs, equivalent to increases of approximately 0.8% and 1.7%, respectively.

Table 7: Difference-in-difference-in-differences: KS4

DDD - KS4 Sample		Est1		
	Est1	Lon Bor	Met	UA
Average Point Score	0.029	0.057	0.047	0.081
	[0.044]	[0.098]	[0.044]	[0.059]
Obs	1772830	363400	754897	654533
R-squared	0.13	0.13	0.13	0.13
LSVT Prop	-0.083	7.008	0.311	0.567
	[0.273]	[3.799]*	[0.179]*	[0.411]
Obs	1772830	363400	754897	654533
R-squared	0.13	0.13	0.13	0.13
Five A-C				
LSVT Bin	0.004	0.003	0.009	0.017
	[0.009]	[0.024]	[0.009]	[0.015]
Obs	1825934	372567	778047	675320
R-squared	0.08	0.08	0.08	0.08
LSVT Prop	0.018	1.509	0.035	0.129
	[0.054]	[0.791]*	[0.045]	[0.109]
Obs	1825934	372567	778047	675320
R-squared	0.08	0.08	0.08	0.08
Controls				
Pupil	x	x	x	x
LAD FE	x	x	x	x
Exp*Linear Time	x	x	x	x

[1] Sample *Est* restricts full sample to those LADs which did not conduct an LSVT prior to 2001. Full sample includes all LADs based on the frozen period of local government geography between 2001 and 2008.

[2] Non-met LADs are excluded from the analysis.

[3] LSVT Bin is a binary variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experimental LAD or if the pupil is not FSM-eligible, and equal to 1 if the pupil is FSM-eligible and the year is after the LSVT year of an Experimental LAD.

[4] LSVT Prop is a continuous variable equal to 0 if the LAD is a Non-experimental LAD or if the year is before the LSVT year of an Experimental LAD or if the pupil is not FSM-eligible, and equal to the proportion of total dwellings transferred during the LSVT if the pupil is FSM-eligible and the year is after the LSVT year of an Experimental LAD.

[5] Pupil characteristics include gender, month of birth and ethnicity, LAD FE refers to LAD fixed effects and Exp*Linear Time represents the inclusion of an experimental LAD-specific time trend.

[6] * significant at 10%, ** significant at 5% and *** significant at 1%.

5.3 Discussion

Based on the more robust Differences-in-difference-in-differences identification strategy, the key findings are that LSVTs of social housing stock had an independent and positive causal impact on the Key Stage 3 and 4 outcomes of FSM pupils in London borough LADs. This is the case for all three Key Stage 3 subjects and for both Key Stage 4 performance indicators. Age 14 FSM pupils in London boroughs experienced approximately a 1.5% increase in their Key Stage 3 outcomes in the years after the LSVT relative to non-FSM pupils over the same time period, while age 16 FSM pupils experienced a 3.5% increase in their Key Stage 4 average point score and a 3% higher likelihood of obtaining at least five A-C grades. The impact of LSVTs on educational outcomes is found primarily in London Boroughs and to a lesser extent in Metropolitan LADs in some of the KS3 and KS4 outcomes.

These effect sizes must be placed in context. Firstly, as described in Section 2, the treatment group in the DDD analysis is FSM pupils, chosen on the basis that within an LAD, this group is likely to be more highly correlated with the social housing group than a pupil taken at random. Ideally, information would be available not only on the social housing tenure of the pupil, but in addition on whether the pupil was in a dwelling subject to a transfer, such that the impact of the transfer would be considered with respect to those pupils directly experiencing it. Clearly FSM status and direct experience of a transfer will not be perfectly correlated, and to this extent, the DDD estimates in the analysis represent an underestimate of the true causal impact of the LSVTs. Secondly, these estimates are based on the proportional measure of the LSVT treatment which captures both treatment 'variation' across the experimental and non-experimental LAD groups and treatment 'intensity' within the experimental LAD group. The effect sizes are thus derived from the DDD estimates based on the average proportion of dwellings transferred as part of the LSVT in that LAD type (see footnote 29). The average proportion of total dwellings transferred in London LSVTs was just under 2%, and constituted only 10% of the number of social housing dwellings. The increases of 1.5% and 3.5% in Key Stage 3 and 4 outcomes, respectively, are therefore in response to an LSVT treatment intensity equal to approximately 2% of total dwellings and 10% of social housing dwellings rather than in response to a binary description of the treatment captured by $LSVT\ Bin$. This is important, as although the effect sizes calculated are modest, they are with respect to relatively low treatment intensity. Without presuming too much about the form of the relationship between treatment intensity and effect size, it is plausible that higher proportions of dwellings transferred as part of London

LSVTs would give rise to greater effect sizes.

It is worth noting, however, that a higher intensity of treatment defined in this way does not necessarily imply a greater per-transferred-dwelling improvement to either the home or neighbourhood as a result of the transfer commitments described in Section 1.2. I.e. A greater proportion of total LAD dwellings transferred as part of the LSVT does not necessarily mean that each of those transferred dwellings experiences an equivalent proportional increase in their neighbourhood and/or housing quality. Indeed, one can imagine LSVTs where a higher proportion of total dwellings transferred is associated with lower per-transferred-dwelling investment in either the neighbourhood or housing.

Although not reported, there is also an important secondary finding of the analysis. The DD and DDD analyses are repeated for age 7 Key Stage 1 outcomes and age 11 Key Stage 2 outcomes and no statistically significant association is found between LSVTs and either of these two sets of educational outcomes. Thus the positive educational impact of LSVTs was experienced by adolescents between the ages of 14 and 16 but was not felt by younger pupils aged between 7 and 11. There are a number of possible explanations for this. One might expect improvements in neighbourhood quality, as described in the Introduction, to be more important for teenage pupils who are likely to spend more time outside in the neighbourhood than younger pupils. It is also possible that improvements in housing quality have differential impacts by age. Although, given the mechanisms via which housing quality may impact on child outcomes outlined in the Introduction, there is no reason to believe that housing quality will have a stronger effect on the outcomes of adolescents compared with young children.

There are a number of further possible explanations for the differential results by Key Stage. The FSM rate is higher for primary school pupils (Key Stages 1 and 2) compared with secondary (Key Stages 3 and 4). Thus the correlation between social housing tenure and FSM status which underpins the DDD strategy may be weaker for primary school pupils compared with secondary, resulting in statistically insignificant estimates in the DDD framework for Key Stage 1 and 2 outcomes. Differences in the FSM rate between primary and secondary school pupils may also be associated with other differences important in determining educational attainment between those pupils and their families. For example, primary school FSM pupils may be more likely to be in households with a workless parent compared with secondary school FSM pupils, which may mitigate any improvements in educational outcomes induced by the LSVT. Similarly, even if the characteristics of primary and secondary school FSM pupils are similar, the returns to those characteristics may vary by age, i.e. having a workless parent may be worse for the educational outcomes of primary school children compared with secondary.

Finally, there is more measurement error in the Key Stage 1 and 2 tests compared with Key Stages 3 and 4 and this may have contributed to an attenuation of the estimated impact of the LSVTs on earlier Key Stage outcomes.

6 Conclusion

This paper is the first to investigate the educational impact of the LSVT of social housing stock in England. I show in London Boroughs and Metropolitan LADs, LSVTs improved the Key stage 3 and Key Stage 4 outcomes of pupils, particularly pupils eligible for free school meals. LSVTs did not improve the outcomes of pupils in Unitary Authorities.
These findings have potentially important implications for both education and housing policy, with particular relevance for the most disadvantaged.

Future work should focus on identifying the underlying mechanisms. One approach would be to follow up this work by utilising data on the expenditures by the transfer HAs differentiated by transfer commitment type, to create a more nuanced set of treatment variables. These treatment variables would be able to capture the variation across experimental LADs in the profile of relative housing and neighbourhood investment as part of the delivery of transfer commitments, and thus would help to explore which dimensions of the LSVT-related expenditure by transfer HAs explain the improvement in pupil outcomes. Analysis using these expenditure-based treatment variables may also help explain why LSVTs are found to have a positive impact on educational outcomes only in London, and to lesser extent Metropolitan, LADs. As mentioned in the Introduction, both London Borough and Metropolitan LADs are predominantly urban, and had high levels of housing debt pre-LSVT and social housing estates with high levels of deprivation. Thus exploring possible differences in the transfer HA expenditure profiles after LSVTs between the predominantly urban (London Boroughs, Metropolitan) and rural (Unitary Authorities) LADs appears to be a promising direction in attempting to explain the differences in LSVT impact shown here. Finally, expenditure-based LSVT treatment variables could potentially explain the difference in the educational impact of LSVTs between KS1 and KS2 pupils, and KS3 and KS4 pupils.

References

[1] JW Andriessen, B Brunekreef, W Roemer, et al. Home dampness and respiratory health status in european children. *Clinical and Experimental Allergy*, 28:1191–1200, 1998.

[2] Andy Barton, Meryl Basham, Chris Foy, Ken Buckingham, and Margaret Somerville. The watcombe housing study: the short term effect of improving housing conditions on the health of residents. *Journal of epidemiology and community health*, 61(9):771–777, 2007.

[3] Clare M Blackburn, Nick J Spencer, and Janet M Read. Prevalence of childhood disability and the characteristics and circumstances of disabled children in the uk: secondary analysis of the family resources survey. *BMC pediatrics*, 10(1):21, 2010.

[4] Rebekah Levine Coley, Tama Leventhal, Alicia Doyle Lynch, and Melissa Kull. Relations between housing characteristics and the well-being of low-income children and adolescents. *Developmental psychology*, 49(9):1775, 2013.

[5] Ingrid Gould Ellen and Margery Austin Turner. Does neighborhood matter? assessing recent evidence. *Housing Policy Debate*, 8(4):833–866, 1997.

[6] Ray Forrest and Alan Murie. Residualization and council housing: aspects of the changing social relations of housing tenure. *Journal of Social Policy*, 12(04):453–468, 1983.

[7] Ray Forrest and Alan Murie. *Residualisation and council housing: a statistical update*. School for Advanced Urban Studies, University of Bristol Bristol, 1990.

[8] George C Galster. The mechanism (s) of neighbourhood effects: Theory, evidence, and policy implications. In *Neighbourhood effects research: New perspectives*, pages 23–56. Springer, 2012.

[9] Robert Gifford and Cécile Lacombe. Housing quality and children?9s socioemotional health. *Journal of Housing and the Built Environment*, 21(2):177–189, 2006.

[10] David E Jacobs, Jonathan Wilson, Sherry L Dixon, Janet Smith, and Anne Evens. The rela- tionship of housing and population health: a 30-year retrospective analysis. *Environmental Health Perspectives*, 117(4):597, 2009.

[11] Schindler Kahlmeier, C Schindler, L Grize, and C Braun-Fahrländer. Perceived environ- mental housing quality and wellbeing of movers. *Journal of epidemiology and community health*, 55(10):708–715, 2001.

[12] Anthony David Lee. *The development and operation of large scale voluntary transfer asso- ciations 1988-1999*. PhD thesis, London School of Economics and Political Science (LSE), 2002.

[13] Peter Malpass and David Mullins. Local authority housing stock transfer in the uk: from

local initiative to national policy. *Housing Studies*, 17(4):673–686, 2002.

[14] H Pawson, E Davidson, J Morgan, R Smith, and R Edwards. The impacts of housing stock transfers in urban britain (york: Joseph rowntree foundation). 2009.

[15] David P Strachan and Iain M Carey. Home environment and severe asthma in adolescence: a population based case-control study. *Bmj*, 311(7012):1053–1056, 1995.

[16] Steve Wilcox and York (United Kingdom); Joseph Rowntree Foundation. *Housing finance review 1994/95*. Joseph Rowntree Foundation York, 1994.

[17] Rachel Woodward. Mobilising opposition: the campaign against housing action trusts in tower hamlets. *Housing Studies*, 6(1):44–56, 1991.