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ABSTRACT

Human Capital from Childhood Exposure to Homeownership: Evidence from Right-to-Buy*

"Right to Buy" (RTB) was a large-scale UK housing policy whereby incumbent tenants in public housing could buy their properties at heavily subsidised prices. The policy increased the national homeownership rate by over 10 percentage points between 1980 and the late 1990s. A key feature of RTB is that housing tenure changes did not involve residential mobility, as the policy bestowed homeownership on households in disadvantaged neighbourhoods in the public housing where they were already resident. This paper shows that exposure to RTB at birth significantly improved pupil performance in high-stakes exams and the likelihood to obtain a degree, while also improving labour earnings in young adulthood. The key drivers of these human capital gains are the wealth gains arising from the subsidy and the crime reduction generated by RTB. This is evidence of a novel means by which homeownership, and the resulting societal change and neighbourhood gentrification that accompanies it, contribute to increase human capital accumulation and improve educational and work outcomes for individuals in disadvantaged, low-income childhood settings.

JEL Classification: I21, I28, K14, R31
Keywords: human capital, homeownership, public housing

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1. Introduction

In many countries, poor performance at school is spatially concentrated in residential areas characterised by low incomes and low rates of homeownership. Why does this occur? Systematic differences in student performance may arise not just from differences in average incomes of residents between predominantly public and private housing localities, but also because home ownership itself creates opportunities and incentives that are likely to improve education outcomes.[1] Given that pro-homeownership policies have been adopted in major economies over recent decades, understanding the effects of homeownership on education and human capital accumulation is an important issue.[2]

This paper studies the impact of changing neighbourhood homeownership rates on human capital in a novel way. It examines a large-scale, nationwide program of subsidised public housing sales in the United Kingdom (UK) known as the "Right to Buy" policy (hereafter, RTB). This was a flagship policy of the UK Conservative government led by Margaret Thatcher. Through the RTB policy introduced in 1980, incumbent tenants in publicly-owned "council housing" (housing units built and owned by local public authorities and rented to private tenants, henceforth called "public housing") could take ownership of their rented accommodation at heavily-subsidised prices.[3] The intention of the policy was to increase the long-run homeownership rate, which was seen by the Conservative government as a means of improving local amenities and also generating upward intergenerational social mobility by giving citizens control over their housing.[4] The RTB scheme had a substantial

[1] For example, homeownership also endows owners with greater incentives to maintain the security and upkeep of properties, to gain access to better-quality local services and to lower rates of criminality – all of which may improve the educational environment in the locality.

[2] Examples of homeownership programmes include The Housing Choice Voucher (HCV) homeownership program and the HOME Investment Partnerships Program (HOME) assistance by the US Department of Housing and Urban Development. Underlying this is the idea that, when public housing tenants take on ownership of their properties, they are likely to respond to these new opportunities and incentives. Moreover, these incentives can be reinforced through positive feedback as they experience the positive private returns of home-improving investments (such as improving the security of their home) and locality-improving investments (such as investing time and social capital in school activities), which capitalize into house prices, household wealth, and overall increased neighbourhood security.

[3] The terms "council housing" and "social housing" are used synonymously with "public housing" in the UK. Public housing in the United Kingdom is managed in local jurisdictions by councils – hence the term for public housing is "council housing" in the UK. There are also social housing tenancies provided by co-operatives and local housing associations rather than private homeowners. A limited form of tenancy purchase of the latter properties was introduced in the 2000s under the policy "Right to Acquire".

[4] In a speech delivered to the National Housebuilding Council in December 1984, Margaret Thatcher stated: *"Spreading the ownership of property more widely is central to this Government's philosophy. It is central because where property is widely owned, freedom flourishes. Since we took office in 1979, 1.7 million more people have come to own their homes — 1.7 million more sole kings upon their own sole ground. That increase is one of our proudest achievements… But a house is more than this. It is a symbol of security, and a stake in the future. People who own houses do so not just for themselves, but for their children. They do so as members of a responsible society — proud of the heritage derived from the past, glad to care for it, and eager to give the next generation a bit of capital to give them a start."* (See https://www.margaretthatcher.org/document/105815).

impact on housing tenure in the UK, being responsible for an increase in the national homeownership rate in the UK from around 60% in 1979 to over 70% in the early 2000s.[5]

This paper reports estimates of the effects of the change in home ownership rates due to the policy on both educational and downstream labour market outcomes, measured from both administrative and survey records. Administrative records, which cover close to half a million children born at the time of the policy, show that the policy caused an increase in performance in high-stakes exams at age 16 among children residing in the locality of RTB sales. Results show children born in localities experiencing higher RTB sales in the early period of the policy on average achieved better performance in their General Certificate of Secondary Education (GCSE) exams at age 16, using the national benchmark measures of the count of A*-C grades achieved, and by the likelihood to obtain five or more A*-C grades in their GCSE exams.[6]

In particular, childhood exposure to a 1 percentage point greater rate of privatization of the local residential stock in October-December 1980, i.e., the first three months of the RTB scheme, generated a 10-11% increase in the count of A*-C grades in GCSE exams. These estimates reflect an elasticity of student performance with respect to childhood exposure to neighbourhood sales of public housing of approximately +0.04, which implies that a 10% increase in childhood exposure to local public housing sales improved student performance at the end of secondary school by around 0.4%. We show further results for downstream educational and labour market outcomes, as we might expect the positive effects of GCSE performance at aged 16 feed through to positive outcomes in later educational settings and labour market settings. Our estimates return positive elasticities with respect to childhood exposure to neighbourhood sales of public housing for both the likelihood of obtaining a university degree, the likelihood of receiving earnings from paid employment and the average real earnings received from paid employment.

The basis for our causal estimates is a feature of the RTB policy design which created quasi-experimental access to purchasing a home. This is important since common unobservable locality characteristics may determine both the parental decision to buy a property under the RTB scheme and

[5] In particular, while roughly 32% of dwellings in the UK were publicly owned houses in 1979, totalling around 6.2 million properties, by the early 2000s nearly 2.8 million of these properties had been sold to their tenants (Jones and Murie, 2006). Although an innovative and internationally unique policy at the time, RTB has until recently been little analysed by economists (but see Disney and Luo, 2017; Disney et al, 2023). A decade later, similar policies were adopted in a number of countries, especially in eastern and central Europe after the collapse of Communist regimes, and also in China (Jones and Murie, 2006).

[6] Achieving at least 5 subject grades in the range A*-C corresponds to the standard expectation of educational competence at age 16 and it has been shown to be a critical outcome for future educational and professional trajectories in England (Machin et al, 2020).

future student performance. It should be noted that RTB granted actual homeownership to incumbent social renters and, unlike other housing programmes targeted at disadvantaged families, did not feature residential moves. Right to Buy could only be exercised in the same neighbourhood and community – indeed in the same property - as when the property was publicly owned.

Public housing sales might potentially be endogenous to parental choices and an OLS regression of student performance on public housing sales at the time of birth would not retrieve a causal parameter. However, under the RTB policy, eligibility for the discount was a function of a renter's tenure in their public property. Individuals with longer tenures received larger discounts, and individuals with short tenures were not initially eligible for RTB. We explain these facets of the policy in greater detail in Section 2. None of these policy details were general public knowledge before the Thatcher government came to power in 1979, thereby limiting the opportunities for 'gaming the system', at least in the early years of the policy that are utilized here. Therefore, we can exploit this supply-side variation in homeownership subsidy rates for our statistical analysis.

Exploiting this policy feature, the intention-to-treat (ITT) status of GCSE takers is defined by the average length of tenure duration in public housing in 1980 in the locality of the secondary school where GCSE exams were taken at age 16. Since discounts on the market value of properties were directly linked with the length of tenure duration in public housing, this variation is used to define ITT status, and thereby to instrument actual public housing sales in 1980 in the locality of secondary schooling. Variation in the average length of tenure duration in public housing at the start of the RTB policy arise from historical locality-specific factors and we show these are orthogonal to a large set of student and locality characteristics in 1980. The absence of differential trends by ITT status across localities between pupils who were born in the years before the policy rules out that average tenure in the locality itself reflects some other underlying characteristics which might contribute to pupil performance absent the policy.

To mitigate the potential concern that the school where one sits GCSE exams at age 16 may be endogenous to RTB sales in 1980 and, e.g., may reflect the endogenous self-selection of individuals rather than the benefits of RTB, we present a series of tests to rule out self-selection as driving our results. First, if self-selection of individuals was behind the positive correlation between RTB sales in 1980 and GCSE test scores in the 1990s, then again differential trends by ITT status should appear also for pupils born just prior to the RTB scheme, which do not. Our event-study estimates show no evidence of differential trends in performance at GCSE exams between pupils born prior to the reform who sat their GCSE exams in schools differentially exposed to RTB. In addition, we show

that complementary results from longitudinal survey data where the ITT status is defined based on the locality of birth (not schooling at age 16) are in line with our main results from administrative data.

Second, the estimates show positive effects across the distribution of school selectivity and affluence, including among "community schools" in the most deprived areas from which we might expect outward selection Community schools are state-maintained schools with the lowest degree of autonomy from the Local Authority, they cannot set their own fees, nor set their curricula or select pupils based on ability. Compared with private schools and other more autonomous categories of schools, community schools are disproportionately concentrated in relatively poor socio-economic settings. For these reasons, while we cannot fully rule out that some students may have self-selected endogenously in better schools in areas with more RTB sales, the consistency of our results when the analysis is restricted to community schools is strongly indicative that the RTB scheme generated genuine benefits to the human capital accumulation of children and does not merely reflect the self-selection of individuals across schools.

The analysis further shows the results are robust to econometric specification, including the insertion of a large set of covariates capturing time-varying local labour market circumstances, thereby mitigating the concern that public housing sales in a locality under the RTB scheme may have coincided with underlying differential trends in school quality and labour market dynamics. Findings from linked administrative data show that these outcomes were experienced by children across the UK, and not just in London, which was at the forefront of the RTB policy. Results from administrative data are corroborated by survey data estimates, which also show that the policy increased the likelihood of students subsequently completing a degree, their likelihood of being in paid work post-education, their average real wages, and it reduced their dependency on social welfare benefits.

The empirical design allows us to test for, and rule out, a number of potential confounding factors. We show that improved educational performance was not due to selective migration (whereby purchasing a home might induce greater mobility, allowing families to move their children to neighbourhoods where they would be eligible for enrolment into better schools). We show the policy did not induce greater local investment in government-provided schooling. This latter result is unsurprising as, under the policy, the revenue from home sales was returned to central, not local, governments, and we show that the policy was not associated with a differential increase in per-pupil expenditure in schools.

We investigate potential mechanisms by which the policy improved educational performance. One possibility is that the policy affected educational outcomes in part because the subsidy delivered

a wealth effect to households. In providing a subsidy on the market price of housing, the policy by design both increased homeownership and housing wealth among new homeowners. Exploiting variation in local house prices in 1980, which deliver predetermined variation in the money value of the proportionally applied subsidy (where the proportion was determined by tenure), results show the positive educational effects were larger in areas where the wealth effect of the subsidy was also larger. Examining survey-based data on home improvements reported by households, we find evidence that RTB induced greater access to loans to extend or improve the property, while it did not affect access to loans for durables such as cars, computers or internet in the home, or other means of consumption. We also find no significant change in household formation or fertility choices.

The estimates also suggest the policy gave rise to improved educational outcomes via improvements in the local community. Our previous analysis has shown that crime rates, especially property crime, fell more sharply in localities with higher rates of RTB sales in the same period (Disney et al, 2023). Extending that analysis, estimates of the effects of the RTB policy on education outcomes at the Police Force Area (PFA) level are related to estimates of the effects of the RTB policy on crime at the PFA level, as in Disney et al (2023). There is a positive association between estimated education-improving effects and crime-reducing effects at the PFA level. These results echo the conclusions from the MTO experiment in the US, as they show the importance of childhood exposure to crime and violence in determining human capital accumulation and future educational outcomes.

The rest of the paper is structured as follows. Section 2 discusses relevant literature on housing and human capital, and describes the RTB policy. In doing so, it seeks to emphasise the scale of public housing in the UK by 1980 in contrast to, say, the US and to explain why the spatial distribution of public housing did not simply map into low-income areas at the start of the RTB policy. The main data sources are described in Section 3. Section 4 describe the modelling strategy and research design. The main empirical results and a battery of sensitivity tests are presented in Section 5 and in the Appendix to the paper. Section 6 moves to interpretation, studying mechanisms at work behind the core findings, by examining the likelihood that the core results arise because of a household-specific wealth effect or whether they reflect more general neighbourhood effects. Section 7 concludes.

2. Housing and Human Capital

Relevant Research

The RTB experiment provides a rare opportunity to measure a causal impact of childhood exposure to home ownership on human capital accumulation. The parameters estimated are directly of interest

to a policymaker designing a policy that would alter homeownership rights for the general population.[7] Locality characteristics are an important driver of outcomes for children (Chetty and Hendren 2018a, 2018b). As such, this study complements the literature that has examined neighbourhood effects on human capital accumulation by exploiting the variation in residential locations induced by the Moving To Opportunity (MTO) experiment in the US and by other housing policy initiatives in other Western economies.[8] Moreover, there is added value to RTB, relative to MTO, as a housing 'social experiment' as RTB did not involve residential mobility. Households exercising right to buy became homeowners in their existing neighbourhood. In contrast, MTO involved families being given vouchers to rent private housing in more affluent neighbourhoods, and where they also did not take ownership of the housing.

The MTO experiment in the US has been widely examined and is, however, important from a methodological standpoint for this study of RTB as it addresses the basic identification problem of assessing neighbourhood effects on human capital accumulation by exploiting random variation in residential locations. Starting in 1994, the MTO's randomised control trial (RCT) assigned housing vouchers via random lottery to thousands of public housing residents with children in five cities in the US to relocate to less-distressed areas. Fryer and Katz (2013) show that the MTO experiment generated moderate improvements in school quality, as well as educational and economic benefits for young children, including for young boys (Chetty et al, 2016). Katz et al (2001) argue that exposure to violence and crime victimization in distressed areas were in fact key reasons for low-income families to participate in the MTO experiment and go on to show that the MTO experiment improved children's behaviour, adult mental health and perceived safety in treatment group families in Boston, while also reducing exposure to violence and crime victimization. Similarly, Ludwig et al (2001) find that the MTO experiment led to a large reduction in juvenile arrests for violent crimes and to some increase in property-crime arrests in Baltimore. Other findings from the MTO experiment include gender differences in impact (Kling et al, 2005; and Kling et al, 2007).

Using more recent data, Sanbonmatsu et al (2011) find that the MTO initiative enhanced safety in treatment group families, while Ludwig et al (2013) find gender differences in the impact of the MTO experiment on risky behaviour and health of juveniles to persist 10-15 years after the start of

[7] Homeownership is likely to have important implications also for intergenerational mobility, a link that until recently has been little analysed but on which recent studies have emerged (see Blanden et al, 2023; and Bell et al, 2023).
[8] See, e.g., Katz et al (2001); Ludwig et al (2001); Kling et al (2005); Ludwig and Kling (2007); Kling et al (2007); Sanbonmatsu et al (2011); Ludwig et al (2013); Sciandra et al (2013); Damm and Dustmann (2014); Bernasco et al (2017); and Rotger and Galster (2019).

the experiment. However, Sciandra et al (2013) show little evidence of crime reductions in the long run as neighbourhood conditions' effects of MTO dissipate. This contrasts with the findings of Disney et al (2023) that RTB crime reduction effects appear to persist for more than a decade after the implementation of the policy. Substantial exposure effects of neighbourhoods on a variety of families' and children's lives are also presented in Damm and Dustmann (2014), Bernasco et al (2017), Altonji and Mansfield (2018), Chetty and Hendren (2018a, 2018b), and Rotger and Galster (2019).

Whereas MTO provided low-income families with children living in public housing the opportunity to relocate to much less distressed communities, a key difference in the setting we study here is that RTB provided the opportunity for families to purchase their current rental property.[9] Hence RTB presents an important contrasting policy, one of pursuing "endogenous gentrification", with the same aim of achieving improved outcomes for low-income families. While there is substantial evidence of MTO being effective, this paper is concerned with a different topic - whether an approach that subsidises housing tenure transitions *within* the community can also be effective in improving the life outcomes of newborns. Such tenure transitions will be experienced by both the direct recipients of the policy and by others living in the locality who may witness improved amenity effects arising from the policy. Given this, policies aimed at generating tenure transitions within the community, and hence increasing community-level homeownership rates, could be important contributors to local regeneration.

Our paper also relates to a large literature which shows how early childhood conditions play a key role in shaping skills, determining human capital development, and in turn defining later life outcomes of individuals. High-quality early childhood circumstances matter for an array of long-term outcomes (Knudsen et al, 2006; Heckman, 2008; and Heckman et al, 2013), and attributes developed in early years determine a large fraction of the variability in lifetime earnings across individuals (see, e.g., Cunha et al, 2006). Evidence of discrepancy in cognitive and non-cognitive skills can appear as early as prior to the beginning of school (Carneiro and Heckman, 2003; Cunha et al, 2006; and Cunha and Heckman, 2007), with marked differences in the development of skills appearing since early childhood between children from different socio-economic backgrounds. Gaps in family investment can be key sources of this early divergence (see, e.g., Hart and Risley, 1995; Lareau, 2011; Fernald et al, 2013; Kalil, 2013; and Moon, 2014).

[9] A relatively small number of studies consider this issue, including our previous work on effects of the RTB policy on crime (Disney et al, 2023), and a recent study of home-buying subsidies provided to low-income families in Santiago, Chile, which finds positive effects on education attendance and school grades using a fuzzy regression discontinuity design (Fuenzalida et al, 2024).

This paper also relates to a literature that analyses the effects of homeownership and gentrification on crime, focusing on neighbourhood composition effects of policy changes. Aliprantis and Hartley (2015) and Sandler (2017) document reductions in local crime rates in Chicago when 20,000 units of concentrated high-rise public housing were demolished from 1999 to 2011. Both papers follow relocated individuals to other localities, and show that these demolitions reduced crime rates, especially violent (gang-related) crime. Chyn (2018) shows that housing demolitions in Chicago had a positive impact on the schooling, professional and criminal trajectories of displaced individuals. Autor et al (2019) document the crime-reducing impact of the deregulation of rents in Cambridge, Massachusetts. Since rent deregulation raised property values and caused a differential mix of households to locate across local neighbourhoods, it disproportionately reduced the rate of property crime in neighbourhoods that had previously been subject to rent control. Disney et al (2023) show evidence of falls in property crime in areas in England with above-average rates of RTB sales during the early years of the policy.

This is relevant here because, starting from Grogger (1997) and Aizer (2008), a substantial literature has argued that higher local crime rates are associated with poorer school performance and has documented the impact of exposure to violence on school performance. Aizer (2011) is perhaps the first of a series of studies on the effect of violence during pregnancy on birth outcomes. She uses individual-level data from California on maternal hospitalization due to assault and on birth outcomes for the period 1991-2002. These data resemble those used in Ornstein (2017), although this study focuses on a different outcome. Aizer (2011) finds that violence during pregnancy reduces the birthweight of newborns by around 163 grams, with effects being larger if the assault takes place during earlier trimesters. Currie et al (2022) study the same question using data from New York City on birth records (containing information on the residential addresses of the mothers) matched with data on assault incidents (also reporting the location and dates of the incident). Thus, unlike Aizer (2011), rather than comparing mothers who were assaulted during pregnancy with those who were not, they compare mothers who lived in buildings where an assault took place during pregnancy with mothers living in buildings where no assault occurred until the months after the due date. Even though Currie et al (2022) use a different identification strategy and their data capture a broader set of assaults than only those leading to hospitalization, their results confirm the conclusion in Aizer (2011) that assaults during pregnancy significantly worsen birth outcomes (i.e., birth weight and 1-minute Apgar scores). Interestingly, unlike Aizer (2011), they document greater negative effects of assaults in later, rather than earlier, trimesters of pregnancy.

Focusing on the contemporaneous effects of crime, Brown and Velasquez (2017) document the harmful effect of the Mexican war on drugs on human capital accumulation. Monteiro and Rocha (2017) estimate the damaging effect on students' math scores caused by gunfights between drug gangs in Rio de Janeiro's favelas (slums). Bruck et al (2019) show the damaging effect of the Israeli-Palestinian conflict on the educational trajectory of Palestinian high school students. Ang (2021) finds that exposure to police violence in the US generates lasting decreases in GPA, greater incidence of emotional disturbance, increased rates of high school dropout and reduced university enrolment. Koppensteiner and Menezes (2021) show the negative effects of homicides on the way to school in Brazil on school attendance, on standardised test scores in math and Portuguese language and school completion rates, with the effects being particularly pronounced for boys. Evidence of the impact of violence on the mental health of victims and non-victims appears also in Australia (Cornaglia et al, 2014). A range of negative outcomes deriving from childhood exposure to violence also emerge from qualitative research.[10]

Finally, insofar as the RTB policy may have altered the composition of peers in the neighbourhood, our findings also relate to existing evidence on the detrimental impact of exposure to negative peer effects in school, who have the potential to hinder school performance (Robertson and Symons, 2003; Figlio, 2007; Carrell and Hoekstra, 2010; Padilla-Romo and Peluffo, 2023; Sarzosa, 2024) and decrease future earnings (Carrell et al, 2018), while increasing the risk of drug use (Gaviria and Raphael, 2001; Kawaguchi, 2004; Lundborg, 2006; Powell, Tauras and Ross, 2005), cheating (Carrell et al, 2008) and indiscipline in the classroom (Carrell and Hoekstra, 2010).

The Right-to-Buy Policy

The Right-to-Buy (RTB) policy became a flagship policy of the Thatcher government. It facilitated the wide-scale transfer of the ownership of public housing from local authorities to their incumbent housing tenants. For background, Figure A1 illustrates housing tenure shares, by tenure types, in England and Wales between 1918 and 2011. At the turn of the twentieth century, most households in England and Wales rented from private landlords, with only around one-in-five households being homeowners. However, as a result of the Housing, Town Planning Act of 1919 and subsequent legislation, the stock of rented housing built by local councils in England and Wales

[10] Qualitative research shows that children exposed to violence display a greater risk of depression, anxiety, hyper-vigilance, avoidance, aggressive behaviour, delinquency, and a deterioration of cognitive performance (Cooley-Quille et al, 1995; Smith and Tolan, 1998; Fowler et al, 2009; and Sharkey et al, 2014).

developed rapidly.[11] Indeed, by 1980, the year in which the national RTB policy was initiated, public or socially-owned housing in England and Wales accounted for 30% of the housing stock, with most of it built by local councils (hence "council housing") financed by low-cost loans from central government. Public housing in England and Wales had become more extensive, more heterogeneous and more spatially dispersed than in the United States.[12] These spatial outcomes arose from the decisions to rebuild outside as well as within inner city areas given the differential application of planning restrictions across the UK.[13] And the increase in public housing was due to a combination of public investment in housing to replace low-quality slum areas and to rebuild residential areas following the destruction caused by World War II.[14]

For the analysis that follows, in particular to understand our identification strategy, it is important to understand how a household gained access to public housing, and council-built public housing in particular, and how the length of tenure within public housing was determined. Under the 1919 Act and subsequent legislation, the central government provided subsidies to local authorities (councils) to build dwellings leased at below-market rents to households in their area, with priority given to those households that had become homeless (either due to slum clearance, bombing or deprivation) or likely to be on low incomes. Such households could then join a queue (the length of which depended on availability and the priority criteria) to rent these "council houses". Typically, households could remain in council housing or apply for other housing within the same council as family circumstances changed, although improved economic conditions for the household would often induce that household to move to the private sector for better quality housing stock.

Shortly after Margaret Thatcher's election as UK Prime Minister, the Housing Act 1980 introduced a statutory "Right to Buy" for council tenants with at least 3 years' tenure in their council house. As a statutory scheme, the policy had to be implemented by all local councils without exception

[11] Under the 1919 Act, much of the responsibility for replacement housing and slum clearance was given to local councils rather than owners. However, replacement public housing was not simply built in inner-city areas where slum clearance had taken place, but also in so-called suburban 'garden' estates and even 'garden towns' located on greenfield sites. Some of these sites were developed as large-scale public housing projects, often with low-density low-rise properties, others in mixed estates with a mixture of public and private housing. Later in the interwar period, as economic conditions improved, local authorities reverted to replacing inner-city slums with local high-rise buildings in the same neighbourhood, while private developers tended to build in suburbs and rural areas. For further discussion, see https://fet.uwe.ac.uk/conweb/house_ages/council_housing/print.htm and Jones and Murie (2006).

[12] For examples of the heterogeneous nature of public housing across towns, see Table 1 in Disney and Luo (2017). Other European countries saw similar growth in publicly provided accommodation.

[13] For evidence on the continued important role of planning restrictions on private housing supply in England, see Hilber and Vermeulen (2014).

[14] Between 1939 and 1945 around four million homes in the UK were destroyed or seriously damaged by bombing. Although bombing campaigns were initially targeted at military targets during 1939-45, they gradually evolved into area bombing strategies, focusing on cities. See Jones (1978) on the lack of precision of most bombing raids.

(prior to the policy, local councils could choose to sell council housing and a few Conservative councils had allowed their tenants to buy their council property, generally at close-to-market price). A key feature of the RTB policy is that it allowed tenants to buy their properties at substantial discounts to market value, ranging from 33% with three years' residence to a maximum of 50% after 20 years' residence. Later, this minimum duration of residency requirement was reduced and discounts raised. Local councils were also obliged to make mortgages available to would-be purchasers (although this feature became less pertinent as capital markets were liberalised during the 1980s.)

Elements of the policy were designed to avoid tenants gaming the system. To prevent tenants purchasing houses and flipping them on the open market, the discount on the sale price would have to be repaid if the property were resold within five years of an RTB purchase, although a purchased property could be rented out. To prevent individuals from applying for social housing in order to access a discounted property, the subsidy was applicable only with three years' minimum residence. Both features are important for our identification strategy. Aside from these features of the system designed to prevent gaming, the incentive to purchase a council house varied through the 1980s with market conditions. Over time, purchase of public housing under RTB arguably became more attractive, not least because of later efforts by local authorities to raise heavily subsidised rents on council tenancies towards "market" levels.[15]

Appendix Figures A1 and A2 indicate the pattern of sales under the RTB policy in England (the other UK nations saw similar patterns – indeed the large stock of council houses in Scotland was sold even more rapidly, leading to a blanket ban on further sales by the Scottish government some decades later). The two peaks in sales in the 1980s are associated with the introduction of the RTB policy and its liberalisation in the mid-1980s; thereafter, with the better-quality tenants and council houses having moved into the private sector, the rate of sales declined. The policy continued after the Thatcher government ended in 1992, and the incoming Labour government in 1997 did not attempt to reverse the policy completely but did tighten eligibility conditions, limit access to publicly-provided mortgages and impose caps on the maximum discounts in some areas where sales had diminished the public housing stock quickly (since local authorities still had a statutory responsibility to house homeless families). On the other hand, the government also introduced a similar, but less generous version of RTB known as 'Right to Acquire', which allowed tenants in some cases to purchase other forms of social housing (typically managed by 'arms-length' housing associations and charities rather

[15] The economic incentives implied by these various policies are explored at some length in Disney and Luo (2017), but not considered in detail here.

than directly by local public authorities). This led to a brief upsurge in sale volumes in the early 2000s, as illustrated in Appendix Figure A2, although sales continued in any event as public tenants acquired sufficient years' residency in their property to become eligible for the RTB scheme.

3. Data

The empirical analysis utilises a combination of various data sources. First, housing data are provided by the Chartered Institute of Public Finance and Accounting (CIPFA). These data are at the Local Authority (LA) level for the 314 LAs in England and Wales in 1980.[16] The data include details of the composition of the residential housing stock (owned, privately rented and public housing) and the number and value of sales under the Right-to-Buy (RTB) scheme in each year. LAs had a statutory requirement to report RTB sales to CIPFA and provide details of the revenue flow received from the sales. Yearly sales of public housing under the RTB scheme are displayed in Appendix Figure A2.[17]

Second, administrative records of student performance in General Certificate of Secondary Education (GCSE) high-stakes exams contain detailed information on all students enrolled in state-maintained schools in England who sat GCSE exams from the school year 1992/3 to 1999/2000 and born from the year 1977 to 1985.[18] While students in England are expected to sit GCSE exams in year 11 at age 16, administrative GCSE records also include late takers who sat their GCSE exams in year 12 at age 17 (approximately 1 in 5 students).[19] For each student, information on a set of relevant characteristics is collected every year (e.g., on age, gender and the school where the student sat GCSE exams). Student-level information on the count of high-stakes GCSE exams attempted and the count of A*-C grades achieved in GCSE exams is also available (this is used in the UK as a benchmark measure of student performance in GCSE exams). In total from the 1977-85 cohorts there is detailed

[16] The number of LAs changes over time due to some mergers and due to boundary redrawing. There were 314 LAs in England and Wales in 1980 at the onset of the RTB policy.

[17] In addition, Figure A3 Panel A illustrates the distribution of public housing across LAs in 1980 (expressed as a percentage of the residential housing stock). Panel B illustrates the distribution of public housing in absolute terms and Panel C shows the distribution of residential housing in absolute terms. Similarly, Figure A4 Panel A illustrates the distribution of public housing sales across LAs in the 1980-92 period (expressed as a percentage of the residential housing stock in 1980). Panel B illustrates the distribution of public housing sales in the 1980-92 period in absolute terms and Panel C shows the distribution of public housing sales across LAs in the 1980-92 period (expressed as a percentage of the public housing stock in 1980). All distributions in Figures A3 and A4 have a long right tail, and they illustrate the uneven distribution of the public housing stock, the public housing sales, the total residential stock and the ratios of these across LAs in the 1980s.

[18] While some GCSE takers born in 1975-76 also appear in the school years 1992/3 to 1999/2000, these are pupils who sat their GCSE exams in school years 13-17 and thus at much older ages than the norm. Therefore, one would not want to use them as control observations and thus they are excluded from our analysis. Since this issue does not apply to the British Household Panel Survey (BHPS) data, the 1975-76 cohorts are retained in the BHPS analysis.

[19] GCSE exams were modular at this time, so students could re-sit a module to boost their overall grade.

information on student characteristics and school test scores for 4,148,468 students in 3440 state-maintained secondary schools.[20]

Figure 1 uses data for pupils born prior to the RTB scheme and shows a negative correlation at the school level between the average count of A*-C grades in GCSE exams and the share of public housing in 1980. The Figure indicates that students born prior to the RTB scheme who sat their GCSE exams in schools that were characterised by high rates of public housing at the onset of the RTB policy, i.e., in 1980, recorded a relatively poor performance in high-stakes exams at the end of secondary schooling, as proxied by their average count of A*-C grades in GCSE exams.

Third, the British Household Panel Survey (BHPS) data provide records for 3,568 nationally representative individuals born from 1975 to 1985 on their place of birth, place of residence, migration history, educational achievement and professional trajectory. The BHPS data are used to study the impact of the RTB scheme on student performance in GCSE exams as confirmation of the NPD-based results but, additionally, as a panel survey these data can be used to track the same individuals through their further education and university progression, as well as their entry into the labour market.

Data on average length of tenure duration in public housing by locality in 1980 are sourced from the UK General Household Survey (GHS), while for the analysis of mechanisms the same crime data used in Disney et al (2023) are derived from administrative crime records collected by the police and published annually by the UK Home Office in *Criminal Statistics*. These data are provided at the Police Force Area (PFA) geography, a geographic unit that sits above and nests LAs.[21] With the sole exception of London's financial district, commonly known as "the City of London" and which constitutes an independent PFA, data are used for all 42 PFAs that exist in England and Wales.[22] The measures of crime used in the empirical analysis are the numbers of offences of different crime categories per population recorded by all UK local police forces. The data contain offence rates for five crime categories: property crime, defined as the sum of burglary and theft and handling of stolen

[20] Until the late 1990s, most secondary schools in England were termed 'community schools' and were under the control of local educational authorities. In addition to community schools, religious schools (called voluntary controlled or voluntary aided schools) and foundation schools made up the remainder of the state funded secondary sector. Foundation and voluntary aided schools usually have more autonomy than community schools, for example over the selection of pupils and the possibility to charge fees to their students. Up until 2002, community schools operating under the control of local authorities constituted the majority of secondary schools in England.

[21] For example, London LAs sit within the Metropolitan Police PFA.

[22] The City of London constitutes an additional PFA that is independent from the rest of London. However, this PFA is excluded from this analysis because most property in the area is non-residential and very few RTB sales took place there.

goods offences, and violent crime, defined as the sum of violence against the person, sexual offences and robbery offences.

Finally, data from the New Earnings Survey (NES) and the Department for Employment were used to calculate local area conditions in each LA in 1981, while data from the UK Census 1981 were used to calculate local characteristics of the residential stock (e.g., fraction of flats) in the LA at the onset of the RTB scheme.[23] These variables are used as covariates in the econometric analysis.

4. Research Design

The primary objective of this study is to quantify the causal impact of early-childhood exposure to public housing sales on student performance in high-stakes exams at the end of secondary school. A baseline estimating equation for a cohort of exam takers *i* is:

$$Y_i = \alpha_s + \alpha_b + \theta_1 RTB_{iba} + \sum_{j=1}^{J} \beta_{1j} X_{jia} + v_{1iba} \quad (1)$$

where Y is an educational outcome, such as a pupil *i*'s count of A*-C grades in the General Certificate of Secondary Education (GCSE) exams at the end of secondary school, α_s is a set of school fixed effects and α_b is a set of year-of-birth fixed effects. X is a set of controls at the pupil and Local Authority (LA) level, and v_1 is an error term. RTB_{iba} is a continuous variable calculated at the LA level that measures the fraction of the residential stock sold under the Right-to-Buy (RTB) scheme in 1980 in Local Authority *a* where pupil *i* sits GCSE exams.

The RTB policy can be interpreted as a relaxation of a supply constraint on available property for homeownership, allowing public housing tenants to purchase their homes at a subsidy. Of course, this policy does not directly generate a pure natural experiment in observed RTB sales for at least three reasons. First, there may be important time-varying omitted factors that drive both the decision by a tenant to purchase the house and the quality of local schools, such as anticipated local labour market improvement or unobserved public investments on local amenities. Second, RTB sales are a result of demand for public housing purchases together with the local supply of housing for sale. With demand being determined, at least in part, by local school quality, Ordinary Least Squares (OLS) estimates in equation (1) of the relationship between student performance and childhood exposure to public housing sales may suffer from endogeneity bias. It is very likely that the decision by the tenant to

[23] Additional details of the data used in the empirical analysis and instructions for data access are provided in the Appendix.

purchase the house may itself be partly determined by the quality and past dynamics of local schools. Third, the same unobservable family characteristics, e.g., innate ability or parental attitudes and beliefs towards skills development and human capital accumulation of children, may influence both the parental decision to purchase a property under the RTB scheme and the future student performance in GCSE exams. Therefore, OLS estimates of θ_1 in equation (1) are unlikely to reflect the causal estimate of early-childhood exposure to the RTB scheme on student performance in GCSE exams.

The empirical strategy adopted to tackle this potential source of endogeneity bias exploits differences in housing supply across localities under the policy, which arise from both the fraction of public houses in the total housing stock and the size of the purchase discount linked to the average length of tenure duration in public housing in 1980. The national level policy, albeit introduced uniformly across localities in 1980, was specified in such a way that eligibility to the RTB scheme and the size of the discounts varied across localities depending on the average number of years spent in public properties by the incumbent tenants prior to the reform, as described in Section 2. Thus, the discounts to purchase a public property generated by RTB were directly related with the years of tenure duration in public housing at the time the RTB scheme was introduced, and years of tenure duration in public housing in 1980 constitutes a predetermined source of differential exposure to the RTB scheme that could not be gamed in 1980.

Combined with the fact that RTB came into force shortly after the 1979 election of the new Thatcher Government, and people in the 1970s could not freely move across public properties (especially between local authorities), but rather had to apply and join a potentially long queue prior to being able to move in and out of public properties, this makes the distribution of RTB eligibility at the onset of the policy quasi-random. For tenure to be endogenous to the policy, households with better education outcomes for their children at age 16 would have needed to anticipate the victory of the Conservative Party in the 1979 General Election, the introduction of the policy by the government in 1980, and that the policy would involve a tenure-based eligibility rule. They would have to have applied to become public housing tenants more than three years earlier, assumed they met other eligibility criteria, under a Labour government at the time which did not advocate widescale a policy of selling public housing, and in anticipation that they would become eligible for the RTB discount were they to move.[24] This seems implausible, and therefore variation in average length of tenure in

[24] The introduction of Right to Buy was not even a policy of the Conservative Party until 1974 and there were no details of the proposed policy until the 1979 General Election manifesto. Even there, the description of the proposed policy was towards the end of the manifesto which focused (like the campaign itself) on curbing trade union power, tax cuts and defence spending.

public housing in 1980 is used both to define our Intention-To-Treat (ITT) proxy for the exposure to the RTB scheme and as an Instrumental Variable (IV) for RTB sales of public housing in 1980. We later show there is no evidence of differential performance in GCSE exams by ITT status in the pre-period prior to introduction of the policy.

Public housing sales under the RTB policy began in most LAs in October 1980 (the 1980 Housing Act was passed on 8 August 1980, with most LAs starting to process applications for public housing purchases soon thereafter). Appendix Figure A2 shows that the RTB policy resulted in an initial peak in public housing sales from October 1980 to 1982, after which RTB sales continued at a slower pace. The initial eligibility to the RTB scheme was mainly responsible for this, and it is therefore exploited empirically in the econometric analysis.

Since the discount on the sale price would be repayable if a property were resold within five years of an RTB purchase and the RTB scheme was increased in generosity in 1986 (especially in relation to publicly built apartments), the analysis includes students born up until 1985. Focusing on these cohorts of newborns, average years of tenure duration in public housing of incumbent tenants in 1980 can be used as an ITT measure of exposure (i.e., eligibility) to the treatment and as an instrumental variable (IV) for the actual sales of public housing under the RTB scheme in 1980, i.e., the first three months of the RTB scheme. To test robustness of our finding, the same IV approach was also used to instrument RTB sales from 1980-1992, i.e., over the entire Thatcher era.[25]

Figure 2 illustrates a strong positive correlation between the LA-specific average years of tenure duration in public housing in 1980 (on the x-axis) and the LA-specific percentage of the residential stock which was sold-off in the first three months of the RTB scheme, i.e., by 1980 (on the y-axis). These initial sales of the residential stock in the first year of the RTB scheme are also positively correlated with the percentage sold-off between 1980 and 1992 (see Figure 3). A strong positive correlation appears also in Figure 4 between the LA-specific average years of tenure duration in public housing in 1980 and the LA-specific percentage of the residential stock which was sold-off in the whole Thatcher era, i.e., in the 1980-92 period. Therefore, while later RTB public housing sales may be the endogenous result of the evolution of local education post-1980, and thereby result in issues of reverse causation or self-selection of individuals in our estimates, the public housing tenure duration

[25] Inevitably, this IV approach becomes weaker as later years are instrumented with our ITT proxying eligibility for RTB in 1980 because, starting from 1986, properties bought under the RTB scheme could be resold in the private market without renouncing the initial discount.

in 1980 constitutes an ITT proxy that strongly predicts the differential intensity of the RTB scheme across localities.

Formally, the empirical strategy retrieves a local average treatment effect (LATE) in a two-stage estimation process as follows:

$$RTB_i=\alpha_s+\alpha_b+\theta_2 ITT_{iba}+\sum_{j=1}^{J}\beta_{2j}X_{jia}+v_{2it} \quad (2)$$

$$Y_i=\alpha_s+\alpha_b+\theta_3 ITT_{iba}+\sum_{j=1}^{J}\beta_{3j}X_{jia}+v_{3it} \quad (3)$$

where α_s is a set of school fixed effects and α_b is a set of year-of-birth fixed effects. ITT_{iba} is an interaction between the average years of tenure duration in public housing in the locality of secondary schooling in 1980 and a binary indicator of whether student *i* was born after the RTB scheme, i.e., in 1981 or later.

Thus, in the first stage (2), estimates of θ_2 show the predictive power of the average years of tenure duration in public housing on actual RTB sales in 1980 and 1980-92 respectively, i.e., RTB. Equation (3) is the reduced form regression of Y on the instrument. The IV LATE estimate is then defined as the ratio of the reduced form coefficient to the first stage coefficient, θ_3/θ_2. Standard errors were clustered at the school level for inference in our main estimates as the average tenure length, i.e., the ITT status, is assigned to each pupil in the analysis based on school location and because residuals in regressions for education outcomes are likely to be correlated between pupils sitting high-stakes GCSE exams in the same school.[26]

5. Main Results

Administrative educational records

Table 1 shows unconditional comparisons of the average means of student performance in General Certificate of Secondary Education (GCSE) exams between pupils sitting GCSE exams in localities with an average value of length of tenure duration in 1980, i.e., the Intention-To-Treat (ITT) measure, equal to or greater than the national median (i.e., ITT students) and pupils sitting GCSE exams in other localities (i.e., non-ITT students). These means are shown separately for the population of all

[26] Robustness to clustering the standard errors at the LA level was tested and these estimates are also presented below.

schools and for community schools, and they provide an indication of the unconditional relationships between our ITT measure and our outcomes of interest.

The unconditional Difference-In-Difference (DiD) comparison in Table 1 shows that ITT students experienced a disproportionate improvement in test scores in GCSE exams following the RTB policy. For both the count of A*-C grades and the likelihood (0/1) of obtaining at least five A*-C grades, the unconditional DiD comparisons presented in the table are positive and statistically significant. The DiD estimates show a 0.08 unit improvement (an approximate 2.2% improvement compared with the pre-period mean) in the simple count of A*-C GCSE grades among all schools, and a 0.167 units (roughly a 5.1%) improvement among community schools. The improvement in the likelihood of obtaining five or more A*-C grades in GCSE exams is a 0.009 unit increase in all schools (corresponding to roughly a 2.3% improvement) and a 0.02 unit (nearly a 6%) improvement in community schools. These estimates cannot be interpreted as causal, but they are suggestive of positive RTB-induced differences in student performance.

Table 2 subjects these estimates to a set of more rigorous econometric specifications, and it presents the main results on the impact of childhood exposure to the RTB public housing sales on student performance. In the top panel, the outcome of interest is the count of A*-C grades in GCSE exams, while in the bottom panel the outcome of interest is the likelihood of obtaining five or more A*-C grades in GCSE exams. Endogenous OLS estimates of equation (1) are shown in Column 1, and imply that a 1 percentage point increase in the privately owned residential stock arising from RTB sales in October-December 1980 is associated with a 2.8% increase both in the count of A*-C grades in GCSE exams and in the likelihood (0/1) of obtaining five or more A*-C grades in GCSE exams. Since only 0.363% of the residential stock was sold to incumbent public housing tenants through the RTB scheme in October-December 1980, i.e., the first three months of the RTB scheme, a 1 percentage point increase in RTB sales corresponds to a 275.5% increase from the 0.363% baseline privatization rate of the residential stock under the RTB scheme in 1980. Hence, this estimate reflects an elasticity for the count of A*-C GCSEs of +0.101 and for the likelihood of obtaining 5 or more GCSEs at grades A*-C of +0.104. This implies that a 10% increase in childhood exposure to public housing sales is associated with an improvement in end-of-secondary-school student performance by around 0.1%.

Our main causal estimates obtained from ITT and IV models are shown in Columns (2)-(6) of Table 2. Columns (2) and (3) present ITT and IV estimates in which the set of controls includes fixed effects for the gender and year of birth of the pupil as well as for the school where the pupil sat

GCSE exams. Columns (4) and (5) add interactions between gender and school fixed effects, between year of birth fixed effects and, respectively, gender fixed effects, school type fixed effects and local area circumstances measured in 1981, and interactions between gender fixed effects and local area circumstances measured in 1981.

Across this range of specifications, the coefficients on the ITT and RTB variable are consistently positive and statistically significant in most of the cases. The implied elasticities for the count of A*-C grades in GCSE exams in the main estimates are in the range +0.3 to +0.7, while for the likelihood of obtaining five or more GCSES at grades A*-C the implied elasticities are in the range of +0.3 to +0.56. The ITT estimates in columns (2) and (4) imply that childhood exposure to a 10% greater eligibility to the RTB scheme led to an improvement in the count of A*-C grades in GCSE exams by around 0.5-0.7% and to a 0.3-0.5% greater likelihood of obtaining five or more GCSES at grades A*-C.

The IV estimates in columns (3) and (5) imply that childhood exposure to a 10% greater rate of privatization of the residential stock under the RTB scheme in 1980 led to an improvement in the count of A*-C grades in GCSE exams and in the likelihood of obtaining five or more GCSES at grades A*-C by around 0.3-0.4%. Finally, in column (6) estimates are presented when the RTB sales over the entire Thatcher era, i.e., the 1980-92 period, are instrumented with our ITT measure of predetermined eligibility to the RTB scheme in 1980. The IV estimates in column (6) imply that childhood exposure to a 10% greater rate of privatization of the residential stock under the RTB scheme over the entire 1980-92 period led to an improvement in end-of-secondary-school student performance by nearly 3%. Appendix Table A1 displays heterogeneous estimates by gender, and results indicate that human capital gains were uniformly distributed between males and females.

Our causal interpretation of these DiD estimates relies on the absence of differential trends among GCSE takers born prior to the RTB scheme by ITT status. To test whether a causal interpretation of the results in Table 2 is warranted, event-study ITT estimates with the same set of controls as in column (4) of Table 2 are shown in Figure 5. The top panel shows estimates for the count of A*-C grades in GCSE exams and the bottom panel shows estimates for the likelihood of obtaining five or more A*-C grades in GCSE exams. In comparison with GCSE takers born in 1977/78, event-study estimates in Figure 5 show no differential trends by ITT status for the cohorts of pupils born up until 1980-81, i.e., the first cohort of GCSE takers born after the start of the RTB scheme. All estimated coefficients testing the presence of differential pre-treatment trends in the

dependent variable prior to the treatment are individually and jointly insignificant, and numerically much smaller than the estimated ITT effect of the RTB scheme.

Evidence of differential performance in GCSE exams by ITT exposure to RTB during childhood starts to appear from the 1981-82 birth cohort of pupils and it increases monotonically up until the 1984-85 birth cohort, when our sample terminates. The fact that estimates do not reach a new level in the post period but rather seem to increase with later cohorts appears sensible, as pupils born in 1984-85 were exposed to a greater "dosage" of RTB sales compared with pupils born earlier.

All the pupils in this analysis sat their GCSE exams from 1993 to 2000, and therefore both pupils born before 1981 *and* pupils born after 1981 could have potentially self-selected in their preferred schools by the time they sat GCSE exams, which would confound our econometric estimates: for this reason, the absence of differential pre-trends by ITT status is at least strongly suggestive that these apparent GCSE performance gains do not reflect selection of individuals across schools in England but rather genuine human capital gains arising from the exposure to the RTB scheme during childhood. This result, as well as the insertion of a large set of interactions between year of birth and covariates capturing time-varying local labour market circumstances also alleviate the concern that our estimates may be picking up some underlying differential trends in school quality and labour market dynamics between ITT and control students.

Sensitivity and tests of robustness

By way of sensitivity tests, Table 3 and Figure 6 replicate the analysis restricting the sample to community schools. The reason for doing this is twofold. First, as explained above, self-selection of students in these schools appears rather implausible because community schools are not selective schools, and they are concentrated in relatively poor socio-economic settings. Second, we present this test because the period from the 1990s onwards witnessed the introduction of liberalizations that allowed schools to become increasingly selective and denominated by religion, and to charge optional fees while still being funded by the state sector. These were known as voluntary controlled (or voluntary aided) schools and were usually granted more autonomy by the local authority than community schools, for example over selection of pupils and charging fees to their students. In our study period, community schools operating under the control of local authorities constituted the majority of secondary schools in England. However, an increasing minority of schools were of this type and the introduction of these schools could possibly affect our results if localities with greater RTB sales were also characterized by higher rates of liberalization of schools.

If our findings were driven largely by subsequent selection of students into better schools as a result of RTB sales, we would expect results for community schools to be weaker or even null. However, that is not what is found here. Unconditional estimates in Table 1 already suggested that ITT eligibility to the RTB scheme coincided with larger GCSE performance gains among students attending community schools, compared to those attending non-community schools. The results in Table 3 and Figure 6 include only community schools and results appear as a strong replication of the results in Table 2 and Figure 5 for all the state-maintained secondary schools in England in the 1990s.

Another concern one might have is that greater ITT eligibility in 1980 may have been concentrated in Greater London, and thus in turn our estimates may be picking up selective migration flows to Greater London during the 1980s. Figure 7 presents event-study ITT estimates analogue to Figure 5 but excluding secondary schools in Greater London, and estimates appear very consistent between Figure 7 and Figure 5. Appendix Table A2 also displays the full set of results excluding secondary schools in Greater London and, also in this case, results appear as a replication of those in Table 2. Therefore, the results in Figure 7 and Appendix Table A2 suggests that selective migration to Greater London in the 1980s is in fact not a plausible mechanism behind our results.

Appendix Figures A5, A6 and A7 display event-study ITT estimates where our ITT measure, i.e., average length of tenure of council tenants in the local authority in 1980, is replaced by a variable measuring the fraction of council tenants in the local authority with at least three years' residency as of 1980, and hence eligible for the scheme. This model exploits the discontinuity in eligibility for the RTB at three years (the extensive margin of eligibility), while the main model exploits the sliding-scale discount with tenure (the intensive margin of eligibility). The estimates in Appendix Figures A5, A6 and A7 return similar estimates to those in Figures 5, 6 and 7.

We present two additional tests from the administrative data. First, for robustness we test that RTB sales are not associated with higher per pupil expenditure in schools, which could be a confounder in the results. Under the terms of the RTB scheme, revenue from sales was returned to the central government, not the local authorities. If revenue had been returned to local authorities, and in turn local authorities decided to invest this additional revenue in state-provided education, then the causality between RTB sales and educational performance might flow through higher investment. We test for this by replacing our outcome variable with the logarithm of per pupil expenditure in the local authority, which is obtained from local authority records, and re-estimating the same specification as in Figure 5. Event-study estimates are displayed in Figure 8. The Figure shows no significant relationship between our ITT measure in 1980 and per pupil expenditure, indicating that greater per

pupil expenditure in schools in areas characterised by greater eligibility to RTB at the onset of the scheme is not a likely mechanism behind our results.[27] Second, as a sensitivity test we explore whether clustering at the local authority level, rather than at the secondary school level, makes a difference. Event-study ITT estimates for the exact same specification as in Figure 5 but where standard errors are clustered by the local authority are displayed in Figure 9. Here our estimates become more imprecise with the confidence intervals becoming wider, as we would expect due to the small number of local authorities. However, the pattern of emerging greater statistical significance in later years persists, with estimates for the cohorts born in 1983-85 being statistically significant at the conventional levels, indicating that our substantive conclusions are consistent when clustering at a higher level with a substantially reduced number of clusters.

Survey data measures of educational performance

British Household Panel Survey (BHPS) data provide a wider set of educational outcomes as well as labour market outcomes. The BHPS data contain self-reported information on the place of birth, place of residence, migration history, educational achievement, professional trajectory and several other individual characteristics (e.g., gender, year of birth, month of birth) for 3,568 nationally representative individuals born from 1975 to 1985. We combined BHPS data with the administrative records on RTB sales and average years of tenure duration in public housing prior to 1980 to again study the impact of the RTB scheme on student performance in GCSE exams and to follow the same individuals through their further education, university progression and entry into the labour market.

The same ITT specifications as in Tables 2 and 3 were estimated again on the BHPS data and a similar set of control variables were added to the estimated equations using the BHPS data. While school fixed effects cannot be added to the estimated equation because information on the school where GCSE exams were taken is not contained in the BHPS data, availability of information on the locality of birth allows us to define the ITT status based on the place of birth and not the place of residence at the time of the survey. Thus, use of BHPS data allows us to ask our questions of interest on post-16 outcomes, but also to mitigate the concern that selective migration might have occurred across schools and may act as a confounder in the results using administrative data on the universe of GCSE takers in 1993-2000. The available information in the BHPS data on the locality of birth allows us to define the ITT status based on the place of birth and to identify our effects of interest while controlling for locality of birth fixed effects and survey year fixed effects. The available information

[27] Appendix Figure A8 shows consistency in our conclusions from Figure 8 when using the fraction of eligible tenants in the Local Authority in 1980 for the RTB scheme as ITT measure.

in the BHPS data on the migration history of individuals also allows us to study directly whether the RTB scheme made individuals more likely to move across regions in Britain.

The top panel of Table 4 first shows ITT estimates in which the outcome is whether the individual resides in a home owned by the main resident (in nearly all cases, this is the parent(s) of the pupil) and whether the individual stays in school to sit their GCSE exams. Results indicate positive effects on the likelihood of home ownership, with elasticities estimated in the range +12.7 to +14.7. This evidences the effect of RTB eligibility on homeownership outcomes as reported in the survey data and it implies that childhood exposure to a 10% greater eligibility to the RTB scheme led to an increased likelihood of home ownership by around 12.7-14.7%. Results also show positive effects on the likelihood of sitting the GCSE exams with elasticities in the range +1.8 to +1.9, implying that childhood exposure to a 10% greater eligibility to the RTB scheme led to a 1.8-1.9% greater likelihood of sitting the GCSE exams. Hence, RTB sales lead not only to improved GCSE performance among those taking GCSE exams (which are compulsory for all pupils aged 16 but are nonetheless subject to a degree of truancy), but also increased the likelihood of sitting the GCSE exams.[28]

The top panel of Table 4 also reports results which replicate the estimates from administrative data for the count of A*-C grades at GCSE and the likelihood of five or more A*-C grades in GCSE exams. Results here also show positive effects on both measures of performance. Estimated elasticities for the count of A*-C grades at GCSE are in the range of +4.7 to +5.2, while estimated elasticities for the likelihood of five or more A*-C grades in GCSE exams are in the range of +6.3 to +6.7. Across the specifications estimated in Table 4, the elasticities are in general higher compared with the results from the administrative data in Tables 2 and 3. This may be due to a combination of factors. First, here the ITT status is defined based on the locality of birth while in the analysis using administrative data it was based on the school where GCSE exams were taken. Thus, the BHPS analysis links more directly the BHPS respondents to their "actual" early childhood exposure to RTB. Second, mean reported exam results in the BHPS sample are much higher than in the administrative sample. In the BHPS sample, the mean count of A*-C GCSE grades is 4.56, whereas it is 3.43 in the administrative data; for the likelihood of five or more A*-C GCSE the comparison is 0.49 vs 0.35 on the 0/1 scale. Thus, BHPS respondents might be positively selected compared with the universe of GCSE takers.[29]

[28] Appendix Table A3 shows consistency in our conclusions from Table 4 when using the fraction of eligible tenants in the Local Authority in 1980 for the RTB scheme as ITT measure.

[29] It is worth noting that removing re-sits from the analysis of the administrative data retrieves an average count of A*-C grades in GCSE exams for the cohorts born prior to RTB (i.e., 4.2 A*-C grades) that is very close to the average count of A*-C grades for the cohorts born prior to RTB in the BHPS data (i.e., 4.6 A*-C grades).

Third, the BHPS data also do not allow controlling for school fixed effects while it controls for locality of birth fixed effects and survey year fixed effects (to control, for instance, for the effect the overall macroeconomic cycle may have on the responses of all individuals in a given year), and this may result in greater magnitudes in the estimated ITT effects.[30]

Survey data measures of downstream outcomes

We further examine a series of downstream educational and labour market outcomes. We might expect that the positive effects on GCSE entrance rates and performance would lead to further positive effects on later educational and labour market outcomes. Therefore, the bottom Panel of Table 4 and Table 5 show estimates of results for downstream education and labour market outcomes. Results in the bottom Panel of Table 4 show positive effects on the likelihood of an individual obtaining a university degree. Results here return elasticities in the range of +11.3 to +11.9.

Estimates shown in the remaining columns of Table 4 show positive downstream effects on labour market outcomes. Positive effects are seen for the likelihood of reporting earnings from labour, transfer or investment income in the last month prior to the survey, for the real value of these earnings from labour, transfer or investment income, and a negative effect on the value of real benefits received. Results in the top panel of Table 5 show positive effects on labour earnings, with an increase in the likelihood of the individual receiving earnings from labour (in the last month) and an increase in the average real earnings from labour received (in the last month). Table 5 also shows in the top panel that greater ITT eligibility to the RTB scheme in 1980 in the locality of birth led to greater real earnings from labour, displaying elasticities in the range of +4 to +4.3 and thus implying that childhood exposure to a 10% greater eligibility to the RTB scheme led to an increase in the real earnings from labour by around 4-4.3%.[31]

These effects on downstream outcomes could potentially be associated with, or derived from, migration and/or household formation. For example, the positive effect on the likelihood of an individual obtaining a university degree might be associated with migration out of the local authority of birth. As another example, the positive effect on earnings from labour, transfers or investments might be associated with household formation and asset sharing between couples. To test for these potential mechanisms, estimates are reported in the remainder of the top panel of Table 5 for the

[30] When the same 1977-85 cohorts are used and "year of survey" is omitted from the controls, the BHPS analysis retrieves a statistically significant 10% elasticity of 2.3%, thus reasonably close to the 10% elasticity of 0.7% from the administrative data analysis displayed in column (4) of Table 2.

[31] Appendix Table A4 shows consistency in our conclusions from Table 5 when using the fraction of eligible tenants in the Local Authority in 1980 for the RTB scheme as ITT measure.

likelihood of migration of the individual away from the local authority of birth and for the likelihood of marriage. Estimates show no statistically significant effects on either outcome. For the likelihood of migration away from the local authority of birth, the coefficients are positive but none of the estimated coefficients are statistically significant at any conventional level. For the likelihood of marriage, the coefficient values vary between positive and negative, and again none are statistically significant. The absence of an effect on migration in particular mitigates the concern that selective migration might have occurred across localities in England and that this may affect our conclusions.

6. Causes of RTB effects

Wealth effects

Our main results establish that the RTB policy had positive effects on educational and downstream labour market outcomes. These effects may have occurred due to neighbourhood changes arising from the transfer of homeownership to tenants, but also may have occurred due to the implied positive wealth effect to RTB households arising from the subsidy, or through a combination of effects. This section tests the role of the wealth effect in determining outcomes in two ways. First, we estimate models for a range of outcomes potentially related to educational performance including the likelihood of having children, access to loans for non-housing products such as cars or other durables and access to loans for housing improvements. Second, we re-estimate our main models incorporating interaction terms for the value of RTB sales in the locality. The subsidy was proportional to the value of the property sold, hence in higher house price areas the money value of the subsidy was higher.

Evidence from consumption and other outcomes

The bottom Panel of Table 5 reports results for a variety of outcome variables potentially affected by the wealth gains of RTB. Results in the bottom panel indicate the policy had no clear positive or negative effects on the number of children in the household (which is used as a proxy for the household fertility rate), indicating that the policy appears not to have led to an increase in the number of children. Results indicate the policy raised the likelihood of individuals obtaining an additional loan to refurbish their properties but not to purchase a car or other consumption. In practice, new homeowners most likely took mortgages to repair or improve the home, alongside purchasing the home. This evidence suggests that homeowners did not take loans to finance non-housing durable consumption in response to the RTB policy.

Evidence from variation in RTB valuations

Table 6 returns to the administrative data used in Tables 1 and 2 and it reports results from models incorporating interaction terms for the value of RTB sales. Results are shown for all schools as in Tables 1 and 2. Estimates in Table 6 indicate that the ITT effects of the RTB scheme on educational outcomes are positive and larger in localities with a higher value of initial RTB discount. This holds true regardless of which ITT measure is used (i.e., whether we use as an ITT measure the length of tenure in public housing in 1980 in the local authority in columns (1), (2), (4) and (5) or the fraction of eligible tenants in 1980 in the local authority in columns (3) and (6)). For example, the interaction term estimates imply positive elasticities for the count of A*-C grades in GCSE exams in the range of +0.5 to +1.1 for our ITT measures, rising by an additional +0.2 to +0.7 for areas with higher-valued RTB sales in 1980. The same pattern is seen for both the count of A*-C grades in GCSE exams and the likelihood of 5 or more A*-C grades in GCSE exams. Both these sets of results therefore indicate the positive effects of RTB sales are larger in higher-valued RTB sale areas, indicating in turn that a significant wealth effect is behind our estimated human capital gains.

Neighbourhood-level effects of RTB sales

Finally, we investigate whether the effects of the RTB scheme on educational outcomes may arise due to neighbourhood changes induced by the policy. One possibility is that the transition to greater home-ownership in local areas through what we termed 'endogenous gentrification' led to enhancement of local social capital. Section 2 noted numerous studies that conclude that neighbourhood composition could affect school performance, especially the incidence of crime and other correlates of crime such as poor housing quality, drug use and so on.

To explore this, we relate our estimates of the effects of the RTB policy on education outcomes at the individual level to the estimates of the effects of the RTB policy on crime outcomes at the Police Force Area (PFA) level obtained by Disney et al (2023). Disney et al (2023) adopt a similar empirical methodology to that used in this paper to estimate the effect of RTB policy on crime, finding that the policy reduced crime. One natural hypothesis to advance is therefore that the crime-reducing effect of RTB in the 1980s and 1990s documented there, i.e., by the time the students in this analysis were born, might be a key mechanism behind the student performance estimates presented here. To answer this question, administrative records collected by the police and published annually by the UK Home Office in *Criminal Statistics* since 1975 at the PFA level, a geographic unit that sits above and nests LAs, were used.[32] These data were merged with the administrative GCSE records

[32] For example, London LAs sit within the Metropolitan Police PFA.

used in the main analysis and the PFA-specific student performance and crime-reducing effects of the RTB scheme were estimated using the same empirical specification as in Column (4) of Table 2. With the sole exception of London's financial district, data are used for all the PFAs that exist in England.[33]

The measures of crime used in this analysis are the numbers of recorded offences of different crime categories per population. Thus, the data capture incidents of crime recorded and classified by all UK local police forces. The data contain offence rates for five crime categories: property crime, defined as the sum of burglary and theft and handling of stolen goods offences, and violent crime, defined as the sum of violence against the person, sexual offences and robbery offences. Total crime is measured as the sum of property crime and violent crime.[34]

Figures 10, 11 and 12 show PFA-specific ITT estimates of the impact of the RTB scheme on student performance plotted against PFA-specific ITT estimates of the impact of the RTB scheme on total crime (Figure 10), property crime (Figure 11) and violent crime (Figure 12). The graphical size of PFA-specific point estimates in the Figures is weighted by the local student population, with London clearly appearing as the most populous PFA in England. In Figures 10-12, the student performance and crime estimates use the same equation specification as in Column (4) of Table 2, but the RTB effects are calculated separately by PFA. For each pupil *i* in the analysis, total crime is measured in the year of birth of pupil *i*. Thus, for each pupil *i* in the analysis, Figures 10-12 are in fact plotting the PFA-specific impact of RTB on end-of-secondary-school performance of pupil *i* against the PFA-specific crime-reducing impact of RTB in the year of birth of pupil *i*. Figures 10-12 display negative and statistically significant relationships, on average by PFA, between the impact of RTB on student performance and the impact of RTB on criminality in the year of birth, implying that the RTB scheme generated the greatest student performance gains in areas where it generated the greatest crime reductions in the early 1980s.[35] This in turn suggests that reduced criminality was a key mechanism through which RTB public housing sales generated human capital accumulation and student performance gains. More broadly, these results echo the conclusions from the MTO experiment in

[33] The City of London constitutes an additional PFA that is independent from the rest of London. However, this PFA is excluded from this analysis because most property in the area is non-residential and consequently few RTB sales took place there.

34 The analysis does not include drugs offences as no data on drugs offences in England and Wales was collected and published by the UK Home Office for the period of this study. Property Crime, defined as the sum of burglary and theft and handling of stolen goods' offences, is overwhelmingly the most common category of crime in 1980. Only the most serious types of violent offences, such as homicide, aggravated assault, sexual offences and robberies, were recorded and published by the Home Office since the 1970s in England and Wales. Minor violent offences only started to be recorded in the UK in the early 2000s. Thus, violent crime is defined here as the sum of serious violence against the person, sexual offences and robbery.

[35] Also in these Figures, the size of PFA-specific point estimates is weighted by the local student population.

the United States, as they show the importance of childhood exposure to crime and violence in determining human capital accumulation and future educational outcomes.

7. Conclusion

This paper studies the human capital accumulation that can result from childhood exposure to homeownership. It offers evidence of student performance gains in national exams, together with later education and labour market impacts, attributable to the increase in homeownership rates induced by the UK Government's Right To Buy (RTB) scheme since 1980. Key features of RTB, that distinguish it from housing programmes for the disadvantaged that have occurred elsewhere, are that it did not involve residential mobility, and that it provided actual homeownership to those who exercised the right to buy their previously council owned property. The programme was large scale, raising the national homeownership rate by over 10 percentage points. A key goal of the scheme, facilitated by its large scale, was to enhance society's social capital by increasing home ownership and, indirectly, to 'gentrify' neighbourhoods previously dominated by rented public housing. By aiming to ease access to an owned property for (broadly) working class families, the policy might alter their behaviour and induce them to take greater care of their property, as well as alter their economic position by giving them a collateral asset in financial markets. The RTB scheme therefore offered a means of upgrading the economic position of households in neighbourhoods previously dominated by public housing.

The RTB scheme generated detectable, sizable school performance gains. Estimates uncover an elasticity of student performance at around age 16 with respect to childhood exposure to neighbourhood sales of public housing of approximately +0.04, so that a 10% increase in early-childhood exposure to public housing sales increased the count of A*-C grades in high-stakes exams at the end of secondary school by around 0.4% and it improved the chance of obtaining five or more A*-C grades in high-stakes exams at the end of secondary school by around 0.3-0.4%. Analysis of post-16 outcomes shows that early-childhood exposure to the RTB scheme also led to improved chances of obtaining a university degree, reduced risk of being in receipt of benefits and improved labour earnings.

More broadly, these results complement the evidence from the MTO experiment in the US as they exploit a different large-scale policy experiment to show that childhood exposure to better and less-distressed neighbourhoods can have major consequences for the educational and labour market outcomes of individuals. The RTB experiment shows that increasing homeownership generates

greater human capital accumulation and student performance gains via two key mechanisms. First, via an income effect: the RTB scheme represents one of the biggest transfers of wealth from the public to private citizens experienced in Western democracies in recent decades, and our study demonstrates that larger discounts in 1980 translated in greater human capital gains by age 16. Second, via a crime reduction as public housing tenants become owners of their own homes *separately* from the process of gentrification whereby low-income neighbourhoods become middle-income neighbourhoods through outward migration of low-income households and inward migration of higher-income households. Thus, these results complement the existing literature and inform policy by showing how granting homeownership to indigenous communities who remain living in the same property they previously rented and did not own can also act to improve human capital accumulation and student performance in high-stakes exams.

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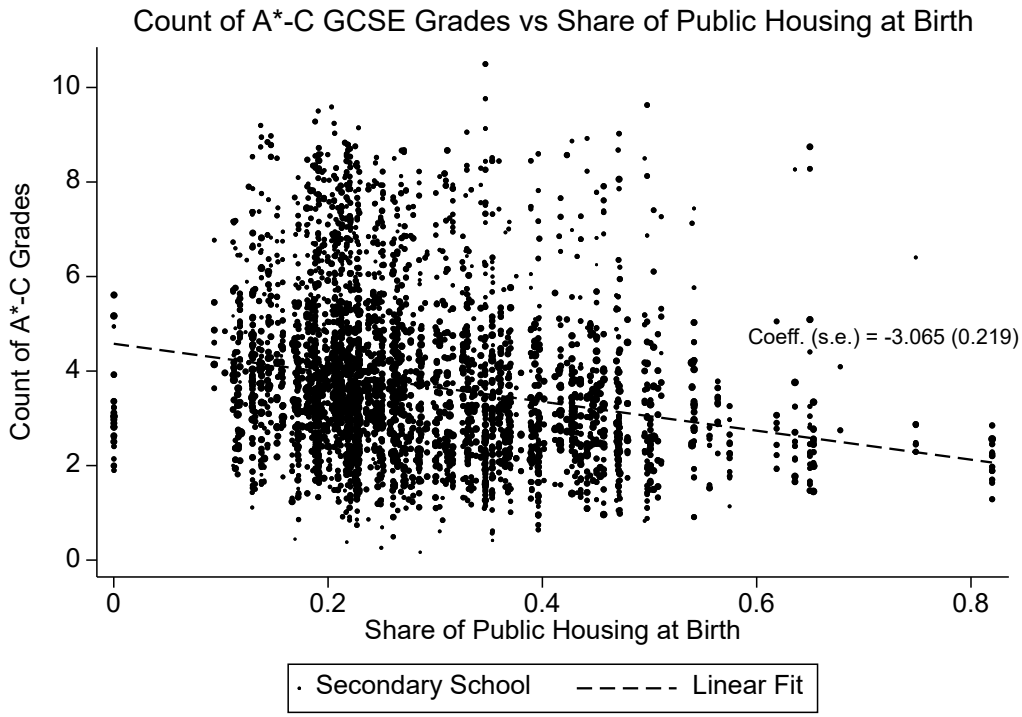
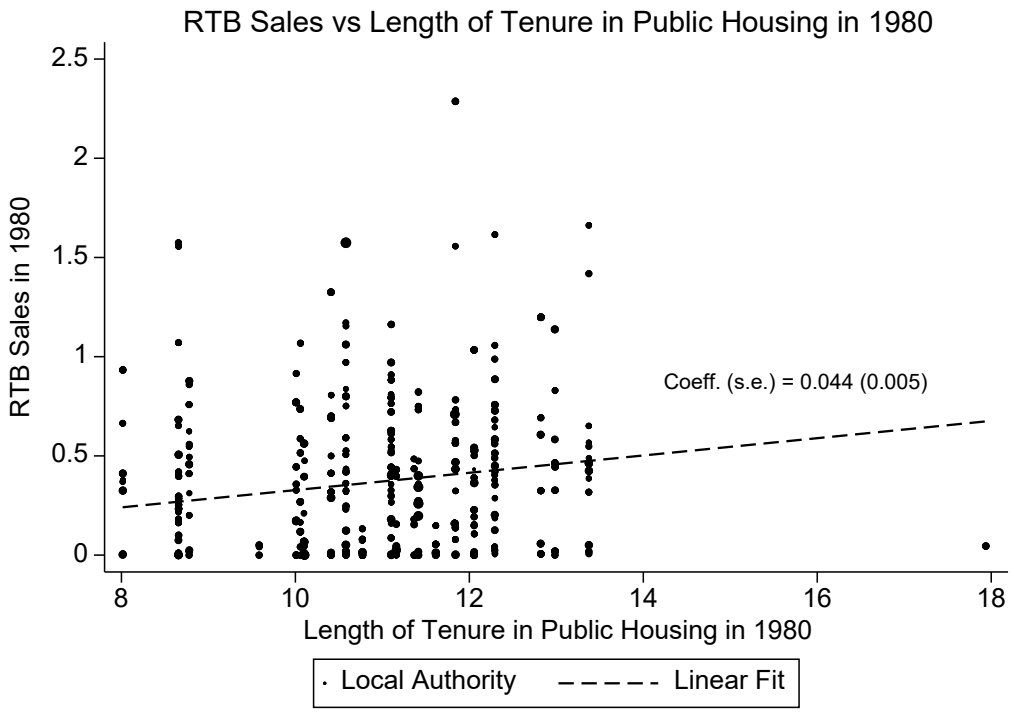
Figure 1. Count of A*-C GCSE Grades vs Share of Public Housing at Birth



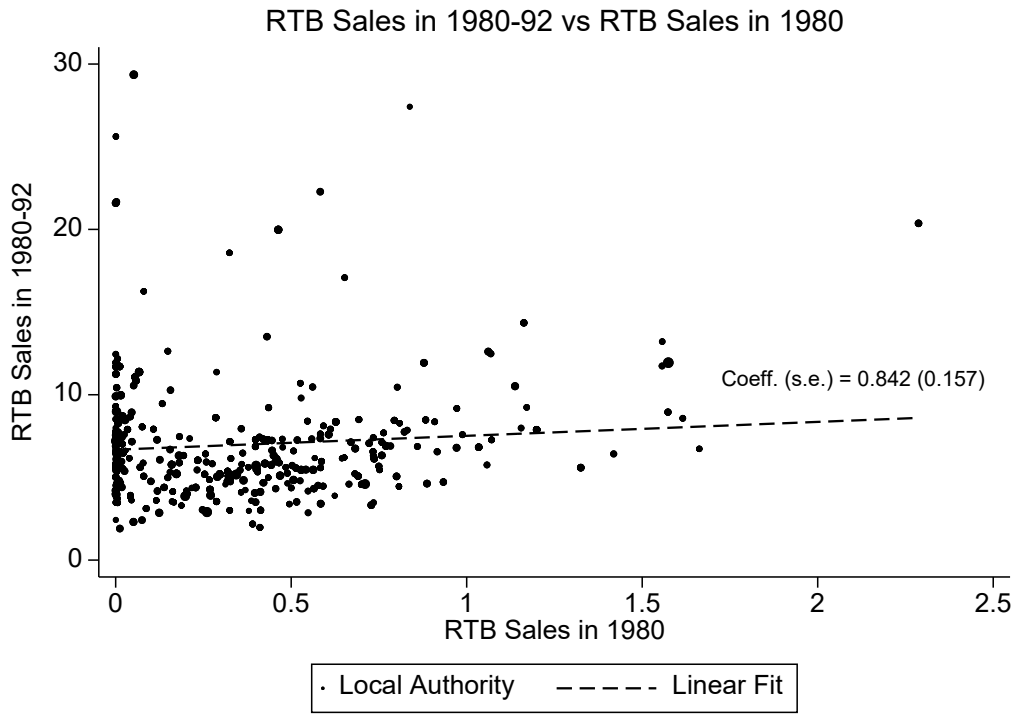
Notes: Figure shows school-specific average count of A*-C Grades in General Certificate of Secondary Education (GCSE) exams for students born prior to 1981 plotted against LA-specific public housing stock expressed as a fraction of the residential stock in 1980. Linear fit is weighted by student population at the school level.

Figure 2. RTB Sales vs Length of Tenure in Public Housing in 1980



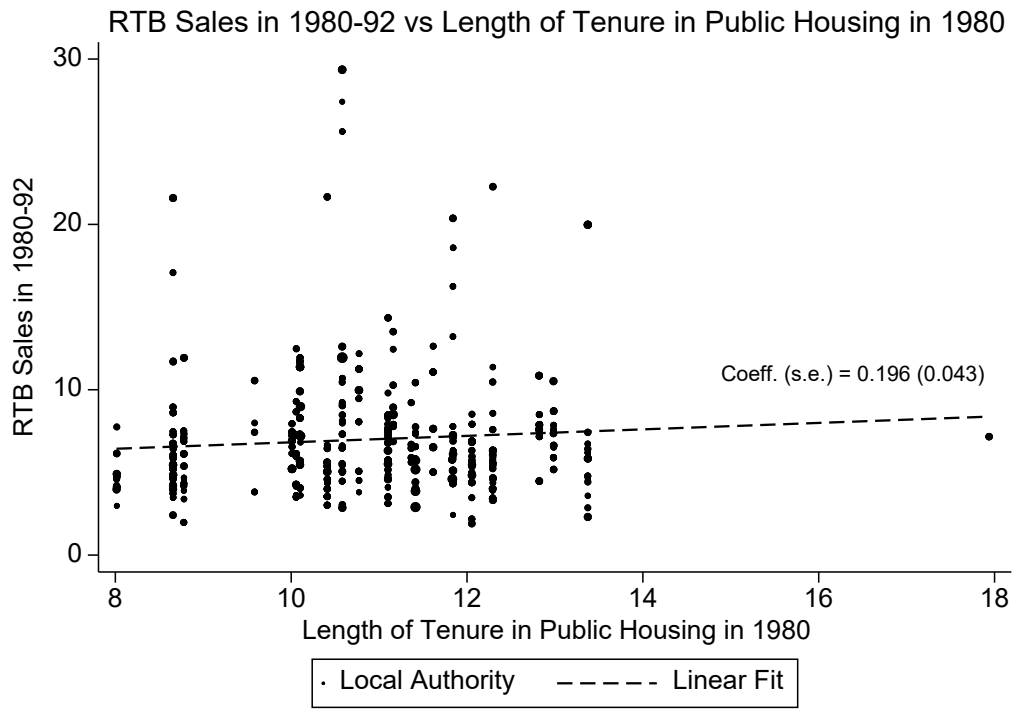
Notes: Figure shows for each Local Authority (LA, shown by dots) the sales of public housing under the Right-To-Buy (RTB) scheme in 1980 plotted against LA-specific average years of tenure duration in public housing in 1980. A linear function fitting the distribution of LA-specific sales and length of tenure duration weighted by LA-specific student population size prior to 1981 is also shown. For each LA, the horizontal axis shows the average years of tenure duration in public housing in 1980, whereas the vertical axis shows the count of RTB sales of public housing in 1980 as a percent of the total residential stock in 1980.

Figure 3. RTB Sales in 1980-92 vs RTB Sales in 1980



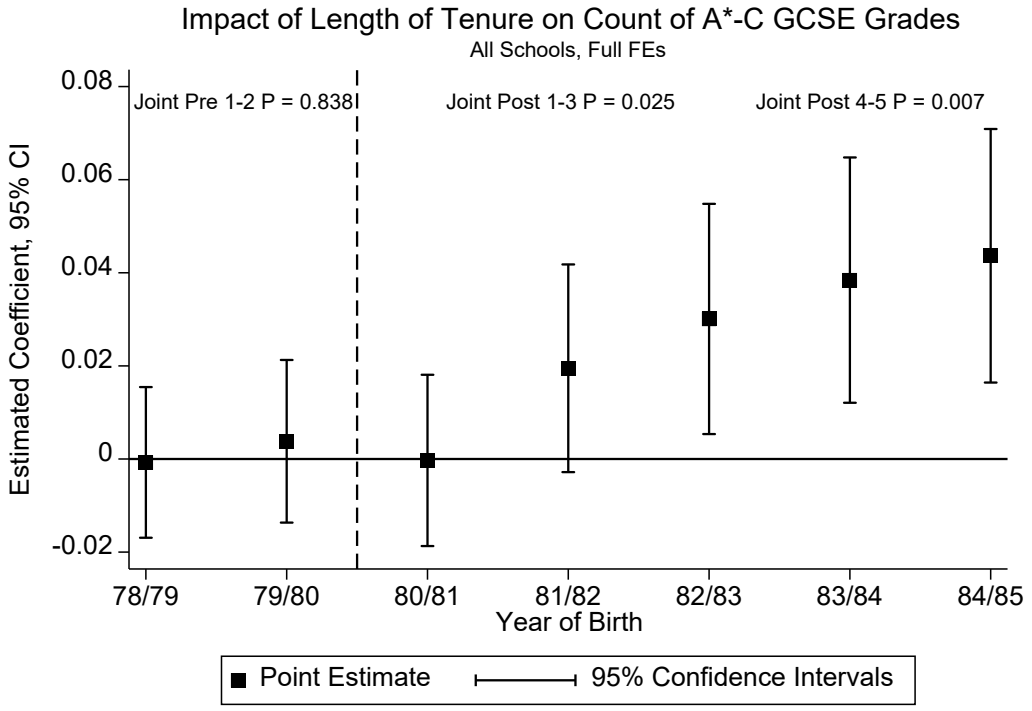
Notes: Figure shows for each Local Authority (LA, shown by dots) the sales of public housing under the Right-To-Buy (RTB) scheme in 1980-92 plotted against LA-specific sales of public housing under the RTB scheme in 1980. A linear function fitting the distribution of LA-specific sales in 1980-92 and 1980 weighted by LA-specific student population size born prior to 1981 is also shown. For each LA in the analysis, the horizontal axis shows the RTB sales of public housing in 1980, whereas the vertical axis shows the count of RTB sales of public housing in 1980-92 as a percent of the total residential stock in 1980.

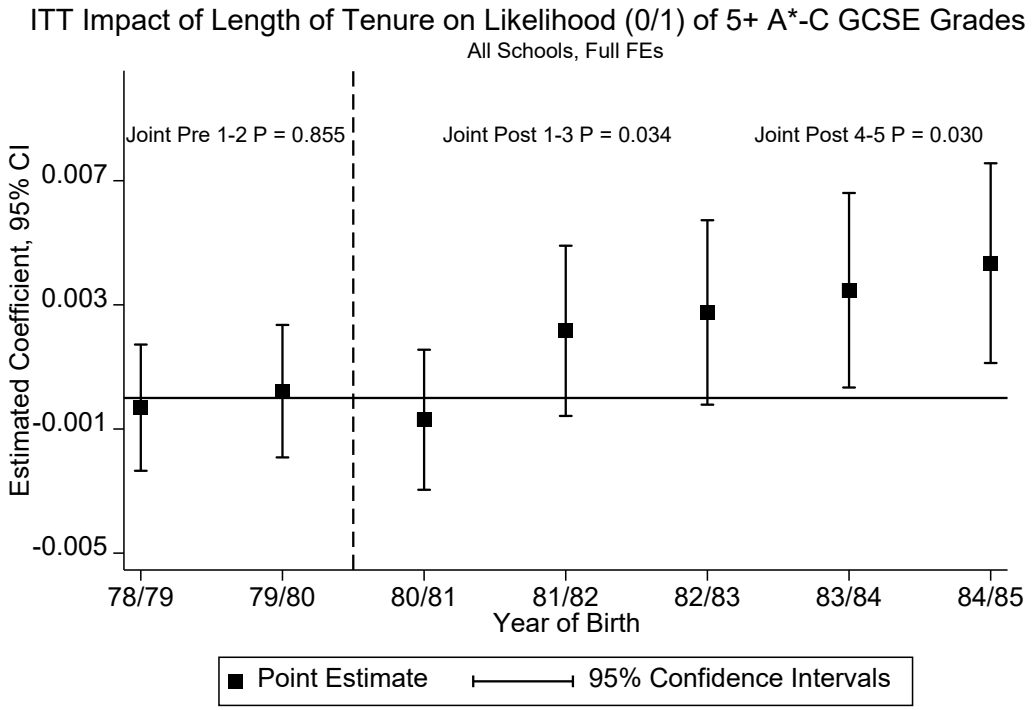
Figure 4. RTB Sales vs Length of Tenure in Public Housing in 1980-92



Notes: Figure shows for each Local Authority (LA, shown by dots) the sales of public housing under the Right-To-Buy (RTB) scheme in 1980-92 plotted against LA-specific average years of tenure duration in public housing in 1980. A linear function fitting the distribution of LA-specific sales and length of tenure duration weighted by LA-specific student population size prior to 1981 is also shown. For each LA in the analysis, the horizontal axis shows the average years of tenure duration in public housing in 1980, whereas the vertical axis shows the count of RTB sales of public housing in 1980-92 as a percent of the total residential stock in 1980.

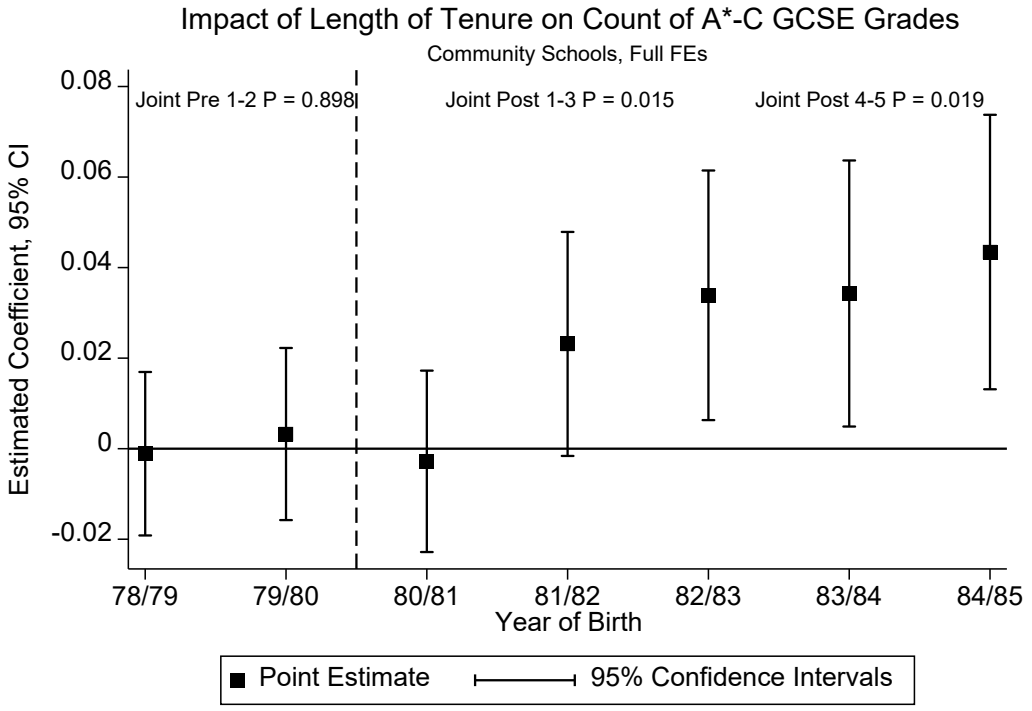
Figure 5. Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams

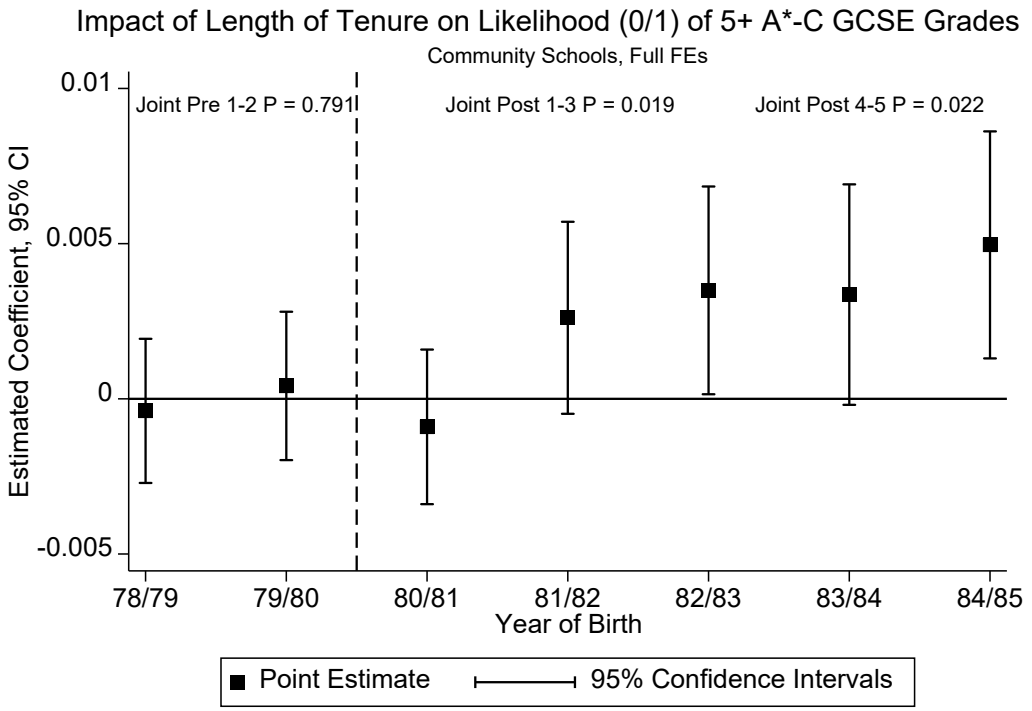




Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85. ITT variable measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

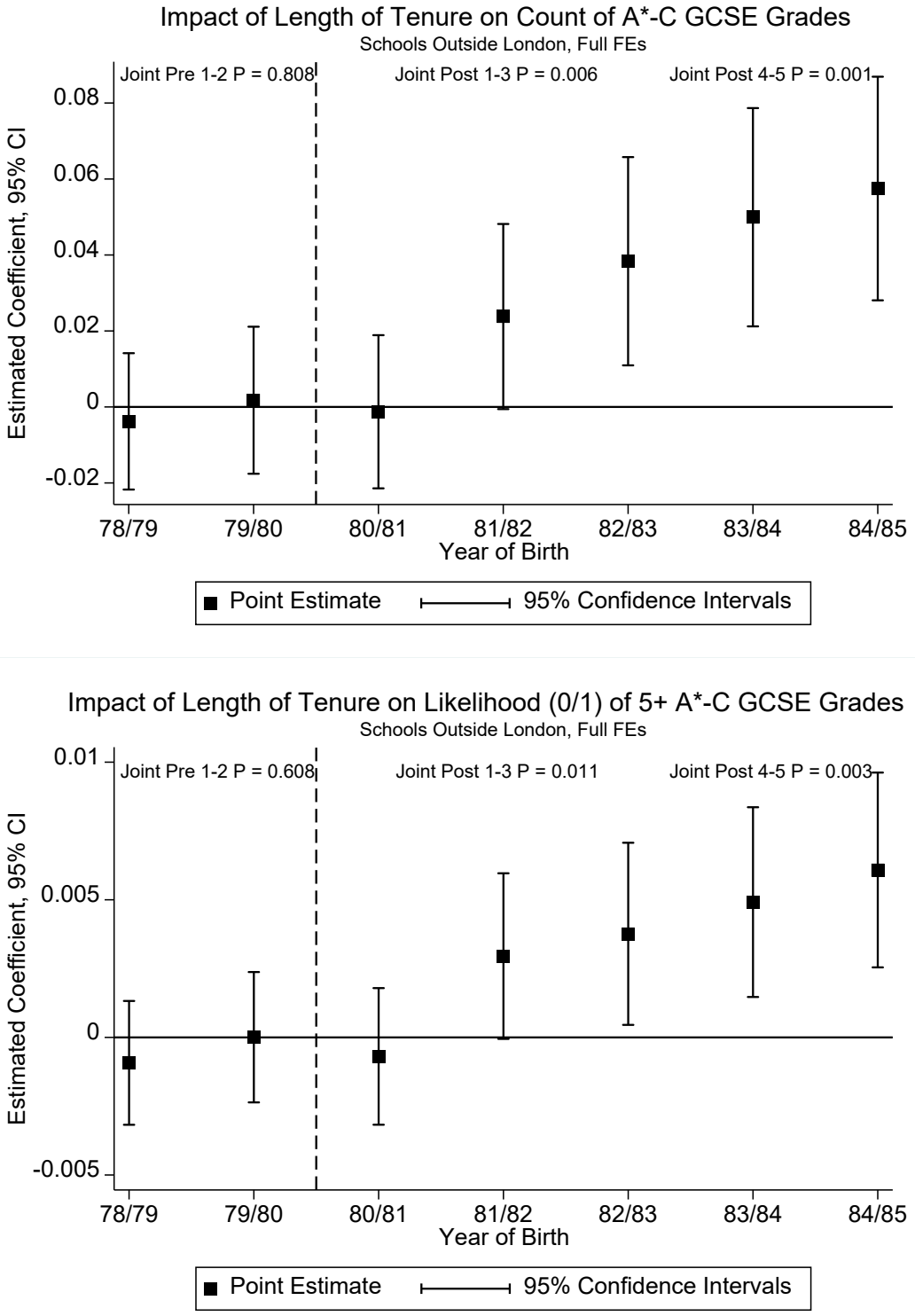
Figure 6. Robustness Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in Community Schools





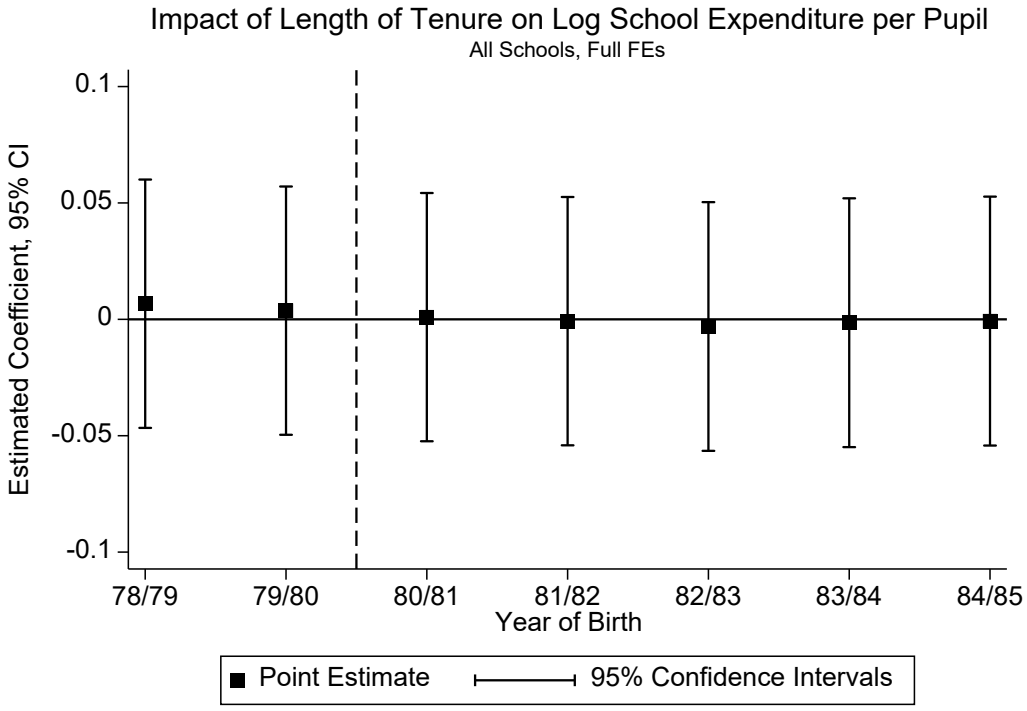
Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in community schools. Analysis includes pupils born in 1977-85. ITT variable measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

Figure 7. Robustness Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in Schools Outside Greater London



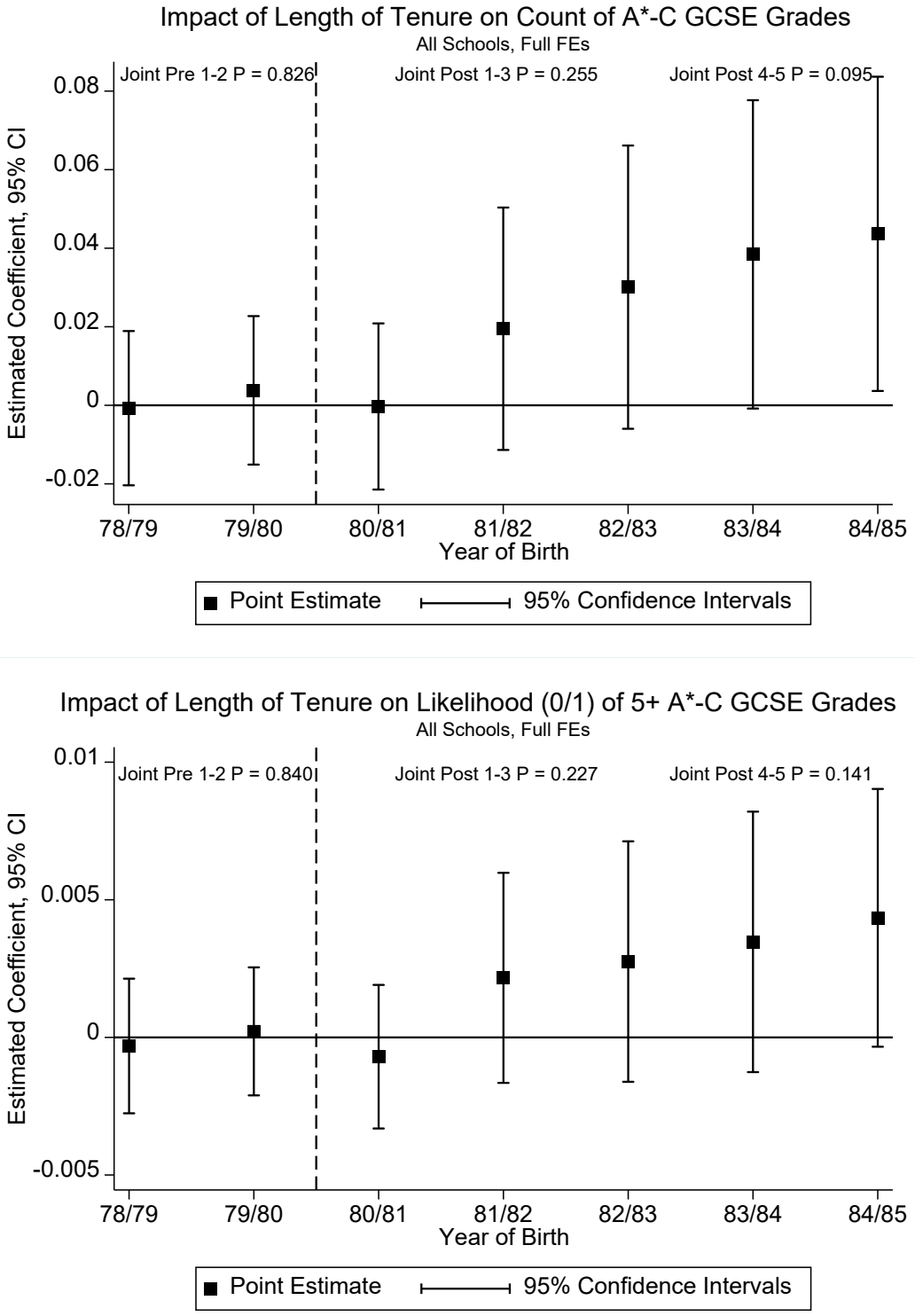
Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in schools outside Greater London. Analysis includes pupils born in 1977-85. ITT variable measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

Figure 8. Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Log School Expenditure per Pupil



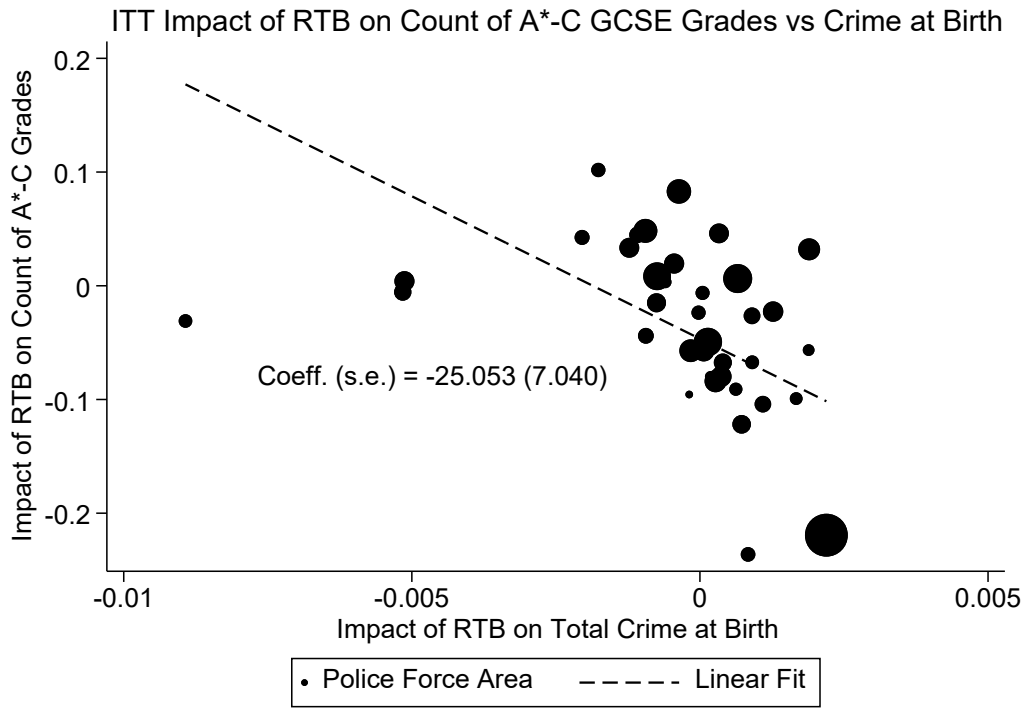
Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on (log) school expenditure per pupil. Analysis includes pupils born in 1977-85. ITT variable measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

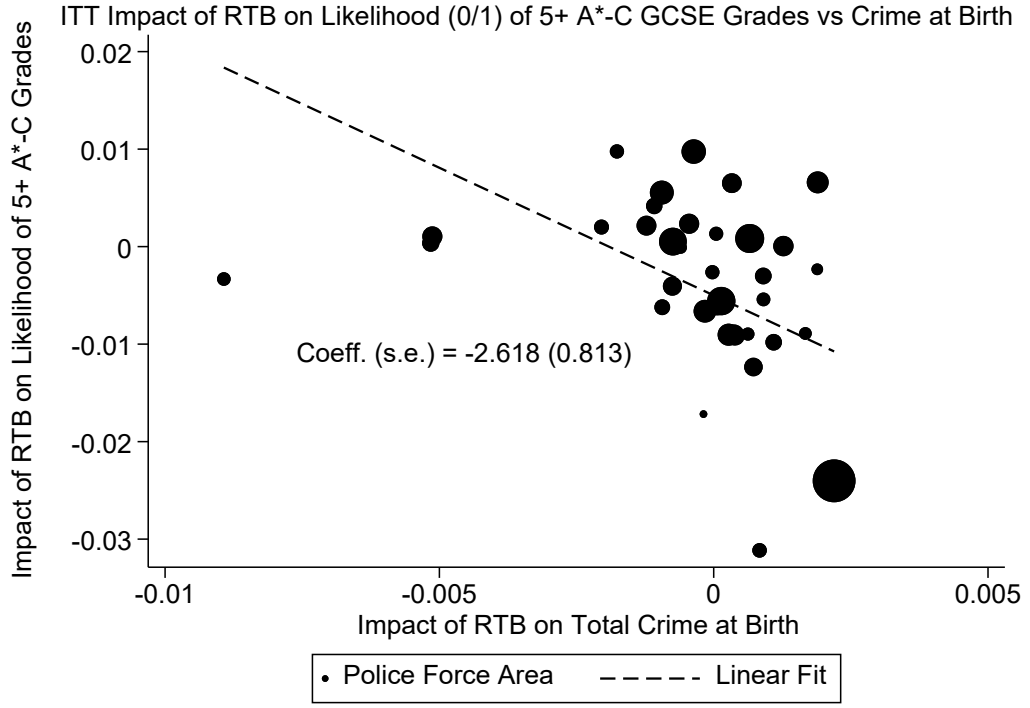
Figure 9. Robustness Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams Clustering the Standard Errors at the Local Authority Level



Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85. ITT variable measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at Local Authority (LA) level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

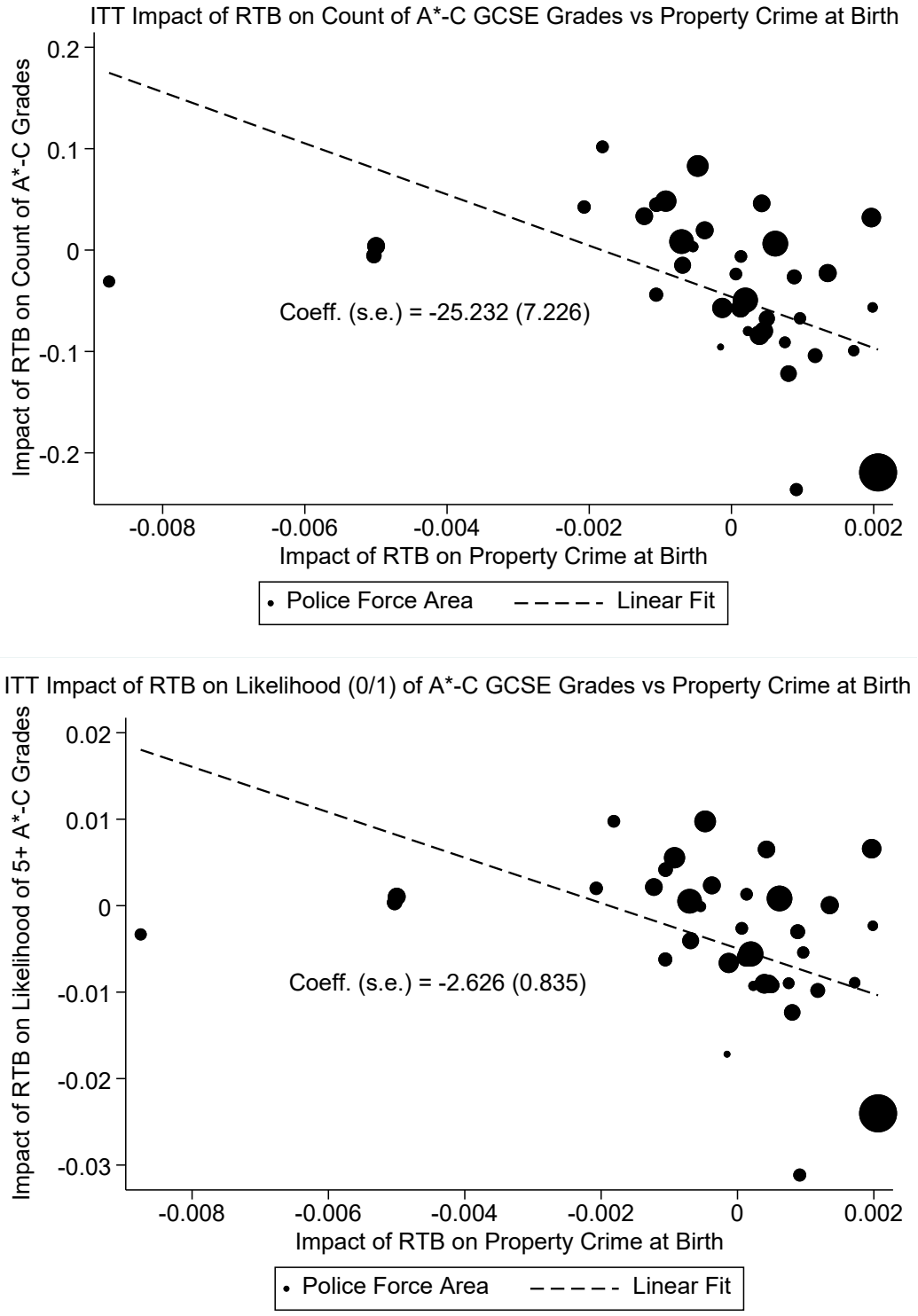
Figure 10. ITT Estimates of Impact of Right-to-Buy (RTB) Scheme on Student Performance in GCSE Exams vs Crime at Birth, by Police Force Area (PFA)





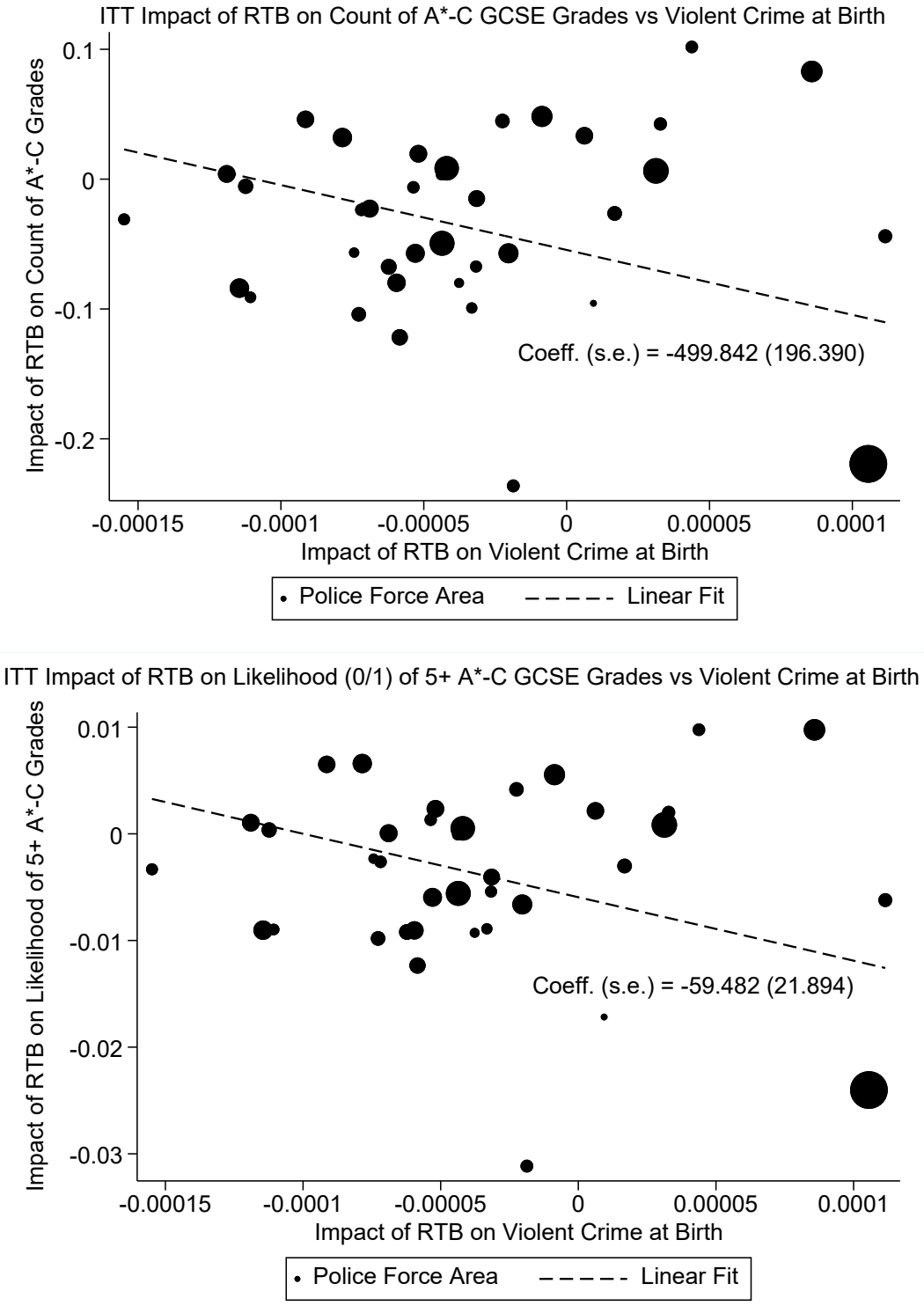
Notes: Figure shows Police Force Area- (PFA-) specific Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) on student performance in General Certificate of Secondary Education (GCSE) exams plotted against PFA-specific estimates of the ITT causal effect of RTB on Total Crime in the year of birth. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. The ITT variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at PFA level. Estimated specification controls for: YoB Fixed Effects (FE), PFA FE, PFA FE x Share of Females in PFA, Yob FE x Share of Females in PFA, Local Area Circumstances, YoB FE x Local Area Circumstances, Share of Females in PFA x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include share of community schools, unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. Crime is measured in the YoB and defined as total yearly counts of property offences (i.e., burglary and theft or handling of stolen goods) and violent offences (i.e., robbery, violent and sexual offences) per population at the PFA level. Linear fit is weighted by students' population at the PFA level.

Figure 11. ITT Estimates of Impact of Right-to-Buy (RTB) Scheme on Student Performance in GCSE Exams vs Property Crime at Birth, by Police Force Area (PFA)



Notes: Figure shows Police Force Area- (PFA-) specific Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) on student performance in General Certificate of Secondary Education (GCSE) exams plotted against PFA-specific estimates of the ITT causal effect of RTB on Property Crime in the year of birth. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. The ITT variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at PFA level. Estimated specification controls for: YoB Fixed Effects (FE), PFA FE, PFA FE x Share of Females in PFA, Yob FE x Share of Females in PFA, Local Area Circumstances, YoB FE x Local Area Circumstances, Share of Females in PFA x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include share of community schools, unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. Property crime is measured in the YoB and defined as total yearly counts of burglary and theft or handling of stolen goods offences per population. Linear fit is weighted by students' population at the PFA level.

Figure 12. ITT Estimates of Impact of Right-to-Buy (RTB) Scheme on Student Performance in GCSE Exams vs Violent Crime at Birth, by Police Force Area (PFA)



Notes: Figure shows Police Force Area- (PFA-) specific Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) on student performance in General Certificate of Secondary Education (GCSE) exams plotted against PFA-specific estimates of the ITT causal effect of RTB on Violent Crime in the year of birth. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. The ITT variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at PFA level. Estimated specification controls for: YoB Fixed Effects (FE), PFA FE, PFA FE x Share of Females in PFA, Yob FE x Share of Females in PFA, Local Area Circumstances, YoB FE x Local Area Circumstances, Share of Females in PFA x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include share of community schools, unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. Violent crime is measured in the YoB and defined as total yearly counts of robbery, violent and sexual offences per population. Linear fit is weighted by students' population at the PFA level.

Table 1. Unconditional Estimates of Impact of RTB Scheme on Student Performance in GCSE Exams

	ITT = Above Median Average Length of Tenure					
	All Schools			Community Schools		
	ITT = 1	ITT = 0	DiD	ITT = 1	ITT = 0	DiD
	Count of A*-C Grades in GCSE Exams					
Pre	3.794	3.610		3.343	3.198	
Post	4.717	4.451		4.231	3.919	
DiD			0.082			0.167
			(0.029)			(0.029)
% DiD			2.217%			5.109%
Mean Dep Var 1977-80			3.698			3.269
	Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams					
Pre	0.395	0.373		0.343	0.326	
Post	0.503	0.472		0.450	0.413	
DiD			0.009			0.020
			(0.003)			(0.004)
% DiD			2.350%			5.988%
Mean Dep Var 1977-80			0.383			0.334
Sample Size			4148468			2794100
Number of Schools			3440			2026

Notes: Post-period defined as starting from cohort 1981/82. Panel A shows results for the Count of A*-C Grades in the General Certificate of Secondary Education (GCSE) Exams and Panel B shows results for the likelihood (0/1) of obtaining five or more A*-C Grades in GCSE Exams. Standard errors were clustered at the school level and they are reported in parentheses.

Table 2. Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in All Schools

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	ITT	IV	ITT	IV	IV
		ITT = Average Length of Tenure				
		IV = RTB Sales in 1980				IV = RTB Sales in 1980-92
		Count of A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.103	0.017	0.375	0.024	0.410	0.157
	(0.028)	(0.008)	(0.177)	(0.008)	(0.148)	(0.069)
% Effect	2.785%	0.460%	10.141%	0.649%	11.087%	4.246%
Elasticity (10%)	0.101%	0.498%	0.368%	0.702%	0.402%	2.965%
Mean Dep Var 1977-80	3.698	3.698	3.698	3.698	3.698	3.698
Mean Expl Var	0.363	10.816	0.363	10.816	0.363	6.982
		Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.011	0.001	0.033	0.002	0.040	0.015
	(0.003)	(0.001)	(0.021)	(0.001)	(0.017)	(0.008)
% Effect	2.872%	0.261%	8.616%	0.522%	10.444%	3.916%
Elasticity (10%)	0.104%	0.282%	0.313%	0.565%	0.379%	2.734%
Mean Dep Var 1977-80	0.383	0.383	0.383	0.383	0.383	0.383
Mean Expl Var	0.363	10.816	0.363	10.816	0.363	6.982
Female FE	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y
School FE	Y	Y	Y	Y	Y	Y
School FE x Female FE	N	N	N	Y	Y	Y
Yob x Female FE, School Type, Local Area Circumstances	N	N	N	Y	Y	Y
Female FE x Local Area Circumstances	N	N	N	Y	Y	Y
Sample Size	4148468	4148468	4148468	4148468	4148468	4148468
Number of Schools	3440	3440	3440	3440	3440	3440

Notes: Table shows estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. RTB Sales are measured in 1980 in the Local Authority (LA) of the school where GCSE exams are taken as a % of the residential stock in 1980. The Intention-To-Treat (ITT) variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors clustered at school level are reported in parentheses. Control variables are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table 3. Robustness Estimates of Impact of RTB Scheme on Student Performance in GCSE Exams in Community Schools

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	ITT	IV	ITT	IV	IV
		ITT = Average Length of Tenure				
		IV = RTB Sales in 1980				IV = RTB Sales in 1980-92
		Count of A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.109	0.024	0.519	0.025	0.421	0.118
	(0.033)	(0.009)	(0.207)	(0.010)	(0.173)	(0.054)
% Effect	3.334%	0.734%	15.876%	0.765%	12.879%	3.610%
Elasticity (10%)	0.117%	0.798%	0.557%	0.832%	0.452%	2.573%
Mean Dep Var 1977-80	3.269	3.269	3.269	3.269	3.269	3.269
Mean Expl Var	0.351	10.871	0.351	10.871	0.351	7.127
		Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.012	0.003	0.055	0.003	0.044	0.012
	(0.004)	(0.001)	(0.024)	(0.001)	(0.020)	(0.006)
% Effect	3.593%	0.898%	16.467%	0.898%	13.174%	3.593%
Elasticity (10%)	0.126%	0.976%	0.578%	0.976%	0.462%	2.561%
Mean Dep Var 1977-80	0.334	0.334	0.334	0.334	0.334	0.334
Mean Expl Var	0.351	10.871	0.351	10.871	0.351	7.127
Female FE	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y
School FE	Y	Y	Y	Y	Y	Y
School FE x Female FE	N	N	N	Y	Y	Y
Yob x Female FE, School Type, Local Area Circumstances	N	N	N	Y	Y	Y
Female FE x Local Area Circumstances	N	N	N	Y	Y	Y
Sample Size	2794100	2794100	2794100	2794100	2794100	2794100
Number of Schools	2026	2026	2026	2026	2026	2026

Notes: Table shows estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in community schools. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. RTB Sales are measured in 1980 in the Local Authority (LA) of the school where GCSE exams are taken as a % of the residential stock in 1980. The Intention-To-Treat (ITT) variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors clustered at school level are reported in parentheses. Control variables are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table 4. Robustness Estimates of Impact of RTB Scheme on Likelihood of Homeownership and Student Performance in GCSE Exams (BHPS)

	ITT = Average Length of Tenure							
	Likelihood (0/1) of Homeownership During/After a Mortgage		Likelihood (0/1) of Sitting GCSE Exams		Count of A*-C Grades in GCSE Exams		Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams	
ITT x Post	0.019	0.022	0.014	0.013	0.186	0.209	0.027	0.029
	(0.006)	(0.006)	(0.006)	(0.007)	(0.063)	(0.077)	(0.009)	(0.011)
ITT x Pre 1		0.006		-0.004		0.049		0.006
		(0.009)		(0.013)		(0.110)		(0.014)
ITT x Pre 2		0.017		-0.003		0.101		0.003
		(0.012)		(0.011)		(0.131)		(0.017)
% Effect	11.047%	12.791%	1.681%	1.561%	4.080%	4.584%	5.466%	5.870%
Elasticity (10%)	12.674%	14.675%	1.929%	1.791%	4.681%	5.259%	6.271%	6.735%
Mean Dep Var 1977-80	0.172	0.172	0.833	0.833	4.559	4.559	0.494	0.494
Mean Expl Var	11.473	11.473	11.473	11.473	11.473	11.473	11.473	11.473
	Likelihood (0/1) of University Degree		Likelihood (0/1) of Earnings from Labour, Transfer or Investment		Real Earnings from Labour, Transfer or Investment		Real Benefits Received	
ITT x Post	0.019	0.018	0.021	0.022	14.726	16.057	-3.840	-3.778
	(0.005)	(0.006)	(0.008)	(0.009)	(6.100)	(6.840)	(1.612)	(1.801)
ITT x Pre 1		-0.002		-0.008		10.210		1.994
		(0.011)		(0.012)		(9.144)		(3.132)
ITT x Pre 2		-0.004		0.014		-2.514		-1.851
		(0.011)		(0.009)		(12.553)		(2.297)
% Effect	10.440%	9.890%	2.574%	2.696%	3.763%	4.104%	-12.694%	-12.489%
Elasticity (10%)	11.978%	11.347%	2.953%	3.093%	4.317%	4.709%	-14.564%	-14.329%
Mean Dep Var 1977-80	0.182	0.182	0.816	0.816	391.299	391.299	30.251	30.251
Mean Expl Var	11.473	11.473	11.473	11.473	11.473	11.473	11.473	11.473
Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y	Y	Y
Local Area FE	Y	Y	Y	Y	Y	Y	Y	Y
Local Area FE x Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Survey Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Survey Year FE x Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Yob x Female FE, Local Area Circumstances	Y	Y	Y	Y	Y	Y	Y	Y
Female FE x Local Area Circumstances	Y	Y	Y	Y	Y	Y	Y	Y
Sample Size	3568	3568	3568	3568	3568	3568	3568	3568
Number of LAs	225	225	225	225	225	225	225	225

Notes: Table shows Intention-To-Treat (ITT) estimates of the causal effect of eligibility to the Right-To-Buy (RTB) Public Housing Sales Scheme on the count of A*-C Grades in General Certificate of Secondary Education (GCSE) Exams. Analysis includes pupils born in 1975-85 and Post-period defined at the individual level based on year of birth (YoB) as starting from 1981. ITT variable measured as average years of tenure in public housing in 1980 in locality of birth. Robust standard errors clustered at Local Authority (LA) level are reported in parentheses. Earnings from Labour, Transfer or Investment and Real Benefits measured in the last month. Control variables measured at LA level in 1981 and include unemployment rate, fraction of population aged 15-24, share of public housing, share of public flats, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table 5. Robustness Estimates of Impact of RTB Scheme on Likelihood of Earnings from Labour, Migration and Marriage (BHPS)

	ITT = Average Length of Tenure							
	Likelihood (0/1) of Earnings from Labour		Real Earnings from Labour		Likelihood (0/1) of Migration Away from LA of Birth		Likelihood (0/1) of Marriage	
ITT x Post	0.016	0.013	12.292	12.898	0.009	0.016	0.001	-0.001
	(0.009)	(0.010)	(5.706)	(6.652)	(0.011)	(0.010)	(0.003)	(0.003)
ITT x Pre 1		0.003		10.004		0.014		-0.008
		(0.014)		(9.786)		(0.014)		(0.004)
ITT x Pre 2		-0.024		-7.265		0.030		-0.004
		(0.018)		(14.088)		(0.015)		(0.007)
% Effect	2.520%	2.047%	3.548%	3.722%	1.818%	3.232%	2.857%	-2.857%
Elasticity (10%)	2.891%	2.349%	4.071%	4.270%	2.086%	3.708%	3.278%	-3.278%
Mean Dep Var 1977-80	0.635	0.635	346.495	346.495	0.495	0.495	0.035	0.035
Mean Expl Var	11.473	11.473	11.473	11.473	11.473	11.473	11.473	11.473
	Count of Own Children		Likelihood (0/1) of Extra Loan		Likelihood (0/1) of Extra Loan for a Car or Other Purchase		Likelihood (0/1) of Extra Loan to Extend or Improve Home	
ITT x Post	0.016	0.004	0.010	0.011	0.002	0.001	0.008	0.011
	(0.018)	(0.016)	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)
ITT x Pre 1		-0.021		0.010		-0.002		0.011
		(0.035)		(0.007)		(0.002)		(0.006)
ITT x Pre 2		-0.053		-0.000		-0.003		0.003
		(0.024)		(0.004)		(0.003)		(0.003)
% Effect	2.852%	0.713%	21.739%	23.913%	18.182%	9.091%	20.513%	28.205%
Elasticity (10%)	3.272%	0.818%	24.941%	27.435%	20.860%	10.430%	23.535%	32.360%
Mean Dep Var 1977-80	0.561	0.561	0.046	0.046	0.011	0.011	0.039	0.039
Mean Expl Var	11.473	11.473	11.473	11.473	11.473	11.473	11.473	11.473
Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y	Y	Y
Local Area FE	Y	Y	Y	Y	Y	Y	Y	Y
Local Area FE x Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Survey Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Survey Year FE x Female FE	Y	Y	Y	Y	Y	Y	Y	Y
Yob x Female FE, Local Area Circumstances	Y	Y	Y	Y	Y	Y	Y	Y
Female FE x Local Area Circumstances	Y	Y	Y	Y	Y	Y	Y	Y
Sample Size	3568	3568	3568	3568	3568	3568	3568	3568
Number of LAs	225	225	225	225	225	225	225	225

Notes: Table shows Intention-To-Treat (ITT) estimates of the causal effect of eligibility to the Right-To-Buy (RTB) Public Housing Sales Scheme on educational and youth labour market outcomes. Analysis includes pupils born in 1975-85 and Post-period defined at the individual level based on year of birth (YoB) as starting from 1981. ITT variable measured as average years of tenure in public housing in 1980 in locality of birth. Robust standard errors clustered at Local Authority (LA) level are reported in parentheses. Earnings from Labour measured in the last month. Control variables measured at LA level in 1981 and include unemployment rate, fraction of population aged 15-24, share of public housing, share of public flats, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

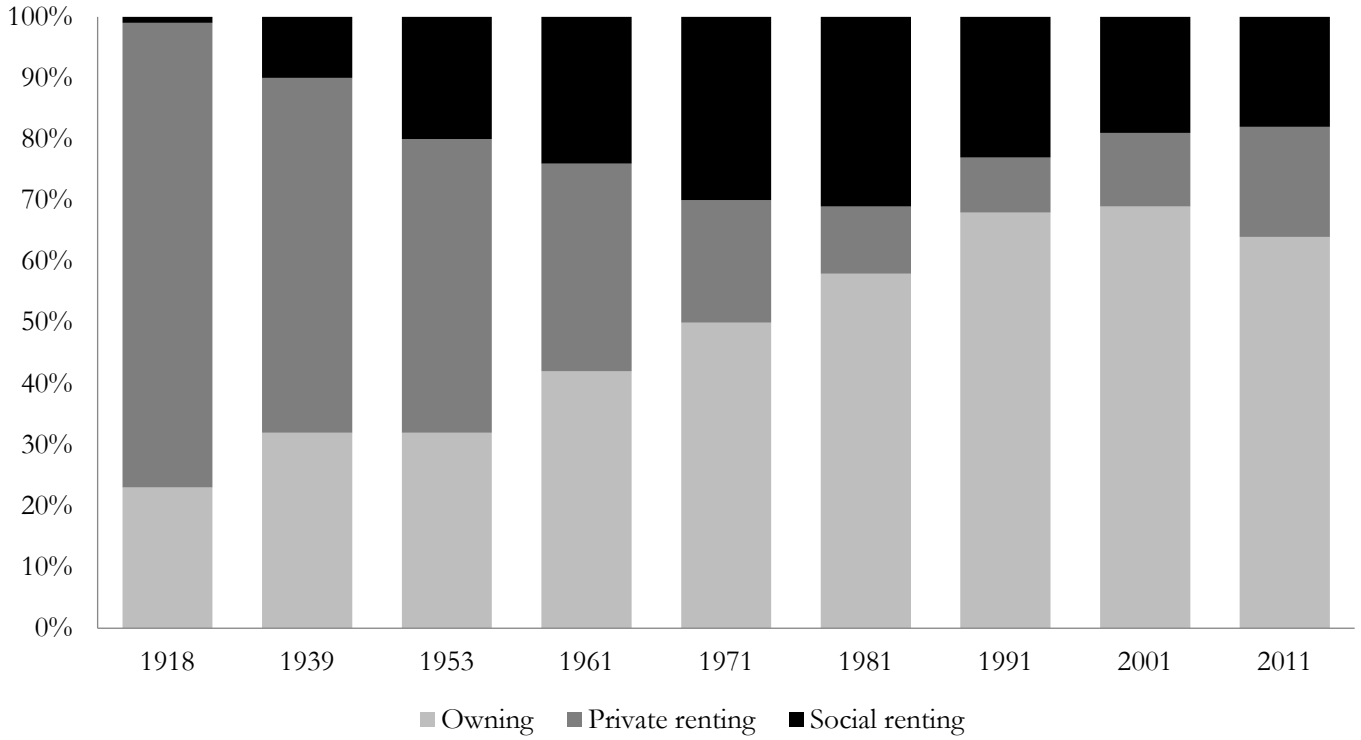
Table 6. ITT Estimates of Income Effect of RTB Scheme on Student Performance in GCSE Exams

	(1)	(2)	(3)	(4)	(5)	(6)
	ITT = Average Length of Tenure		ITT = Fraction Eligible in 1980	ITT = Average Length of Tenure		ITT = Fraction Eligible in 1980
	Count of A*-C Grades in GCSE Exams			Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams		
ITT x Post	0.028	0.024	0.567	0.003	0.002	0.064
	(0.008)	(0.008)	(0.293)	(0.001)	(0.001)	(0.034)
ITT x Post x Value RTB	0.023	0.010	0.010	0.003	0.001	0.001
	(0.003)	(0.004)	(0.004)	(0.000)	(0.001)	(0.001)
% Effect	0.757%	0.649%	15.333%	0.783%	0.522%	16.710%
% Effect x Value RTB	0.622%	0.270%	0.270%	0.783%	0.261%	0.261%
Elasticity (10%)	0.819%	0.702%	1.058%	0.847%	0.565%	1.153%
Elasticity x Value RTB (10%)	0.585%	0.254%	0.254%	0.737%	0.246%	0.246%
Mean Dep Var 1977-80	3.698	3.698	3.698	0.383	0.383	0.383
Mean Expl Var	10.816	10.816	0.690	10.816	10.816	0.690
Mean Expl Var x Value RTB	9.411	9.411	9.411	9.411	9.411	9.411
Female FE	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y
School FE	Y	Y	Y	Y	Y	Y
School FE x Female FE	N	Y	Y	N	Y	Y
Yob x Female FE, School Type, Local Area Circumstances	N	Y	Y	N	Y	Y
Female FE x Local Area Circumstances	N	Y	Y	N	Y	Y
Sample Size	4148468	4148468	4148468	4148468	4148468	4148468
Number of Schools	3440	3440	3440	3440	3440	3440

Notes: Table shows estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. RTB Sales are measured in 1980 in the Local Authority (LA) of the school where GCSE exams are taken as a % of the residential stock in 1980. The Intention-To-Treat (ITT) variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors clustered at school level are reported in parentheses. Control variables are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

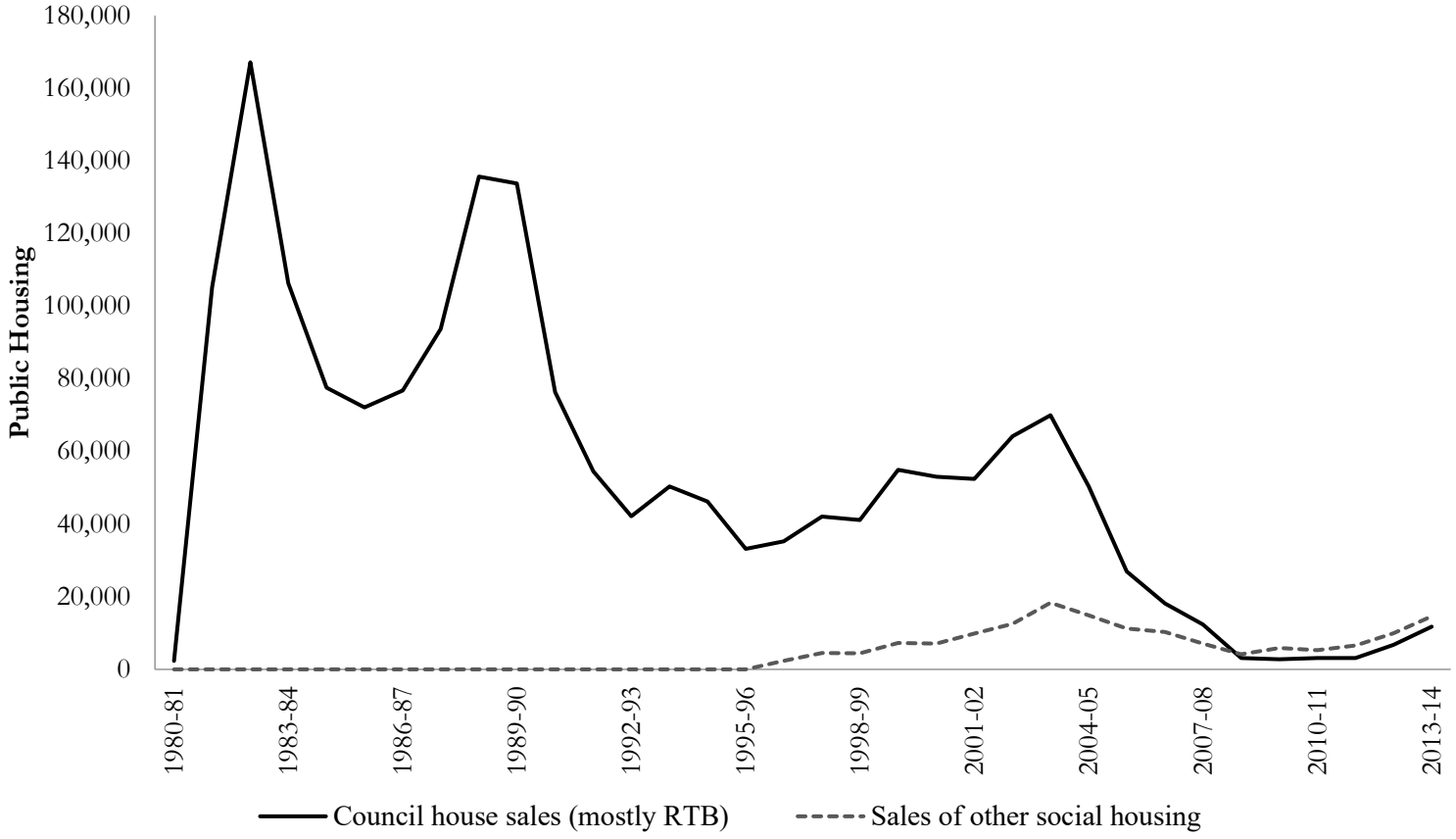
ONLINE APPENDIX FIGURES AND TABLES

Figure A1. Housing Tenure Shares by Tenure Type: England and Wales, 1918-2011



Source: Reproduced from Disney and Luo (2017) Chart 1, calculated from Office for National Statistics (2013).

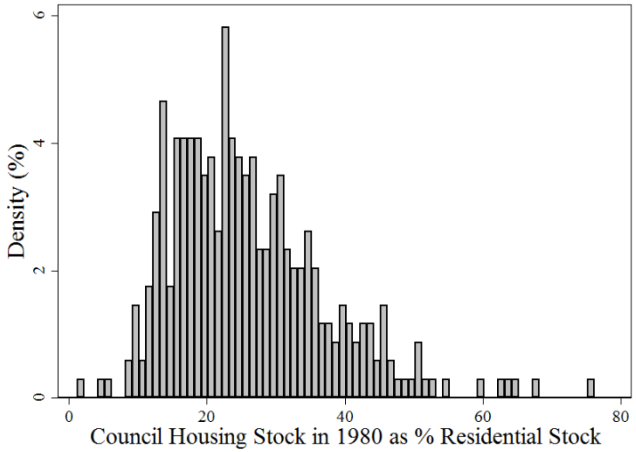
Figure A2. Right to-Buy (RTB) and Other Sales of Public Housing in England, 1980-81 to 2013-14



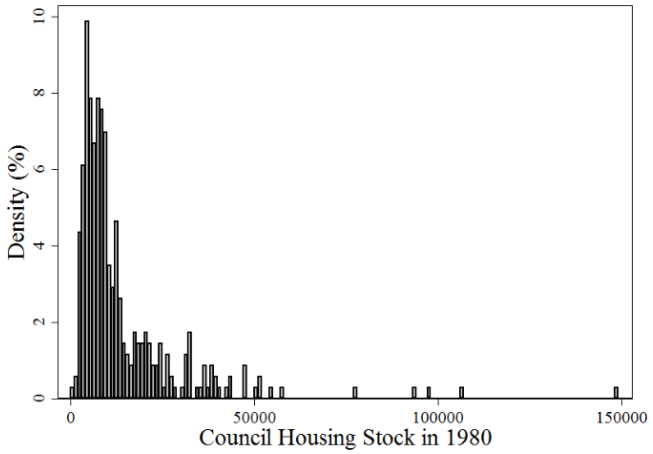
Source: Department of Communities and Local Government Housing Statistics, Table 678.

Figure A3. Residential Housing Stock in 1980, by Local Authority (LA)

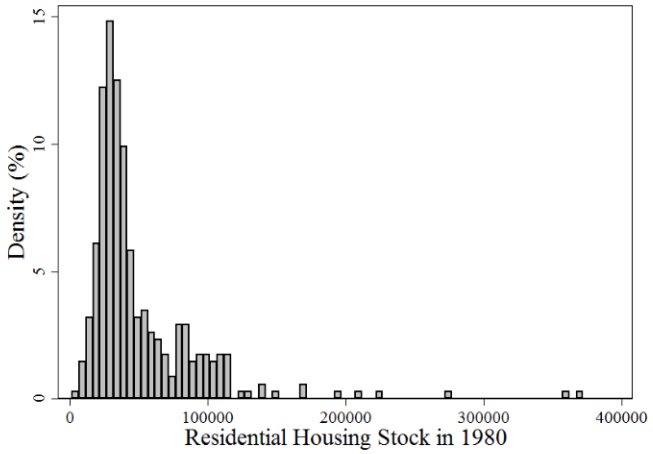
a) Public Housing Stock (% Residential Stock)



a. Public Housing Stock (N)



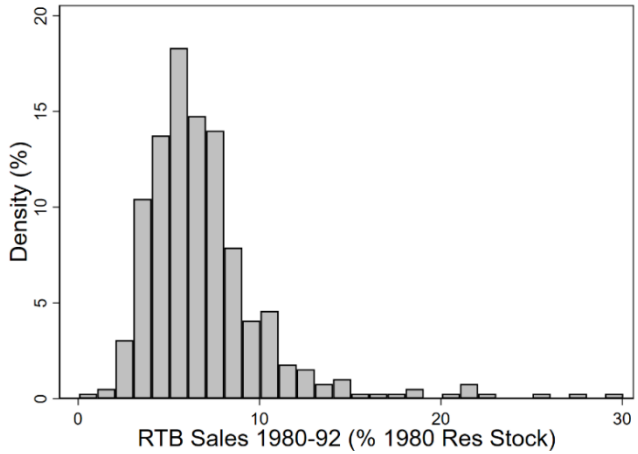
b. Residential Stock (N)



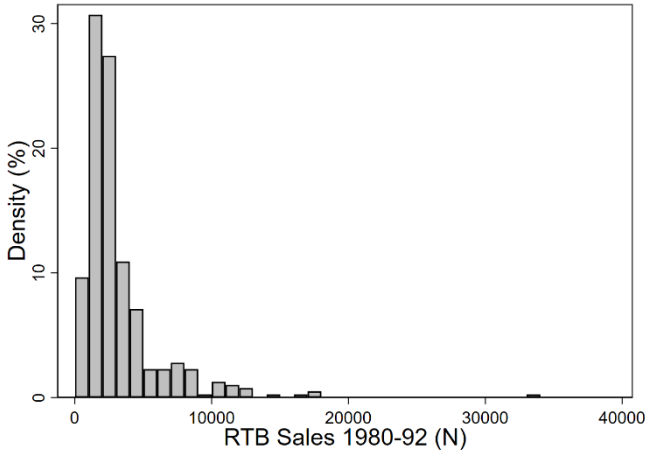
Notes: Data from 344 Local Authority (LA) Districts in 1980. Panel a shows public housing stock in 1980 within the LA (shown in Panel b) divided by the total residential housing stock in 1980 within the LA (shown in Panel c).

Figure A4. Right-to-Buy (RTB) Public Housing Sales 1980-1992, by Local Authority (LA)

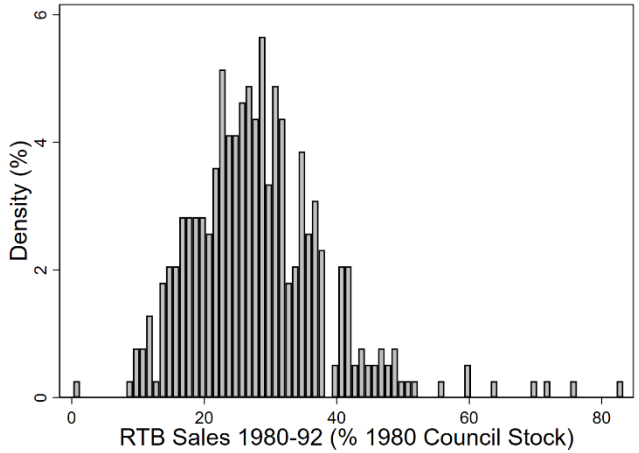
a) Right-to-Buy Public Housing Sales (% 1980 Residential Stock)



b) RTB Public Housing Sales (N)

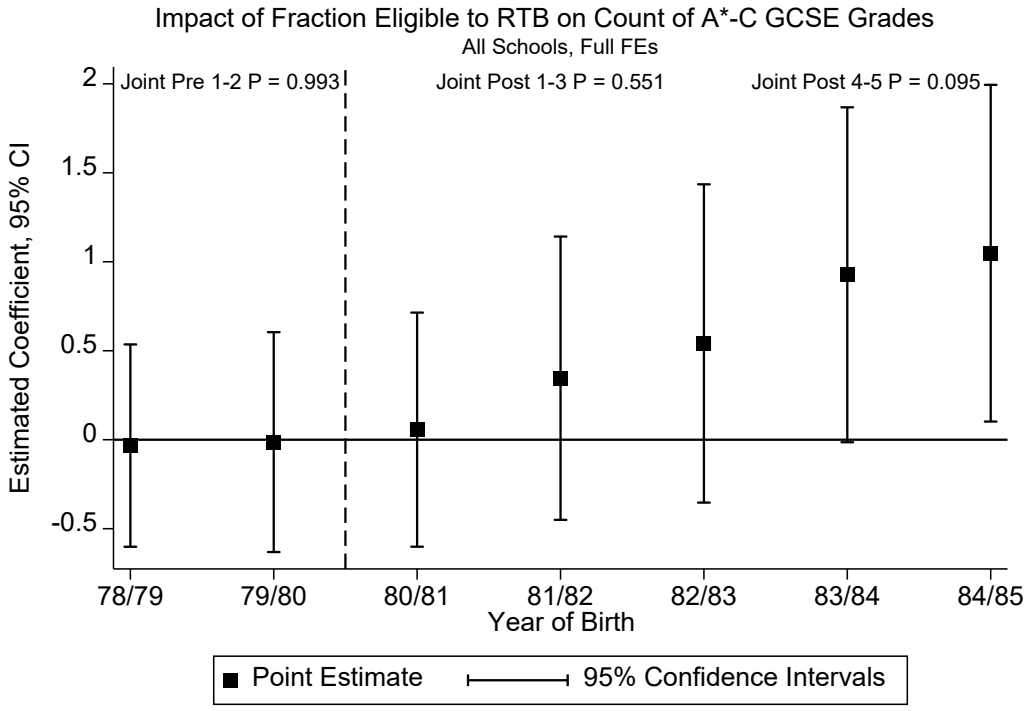


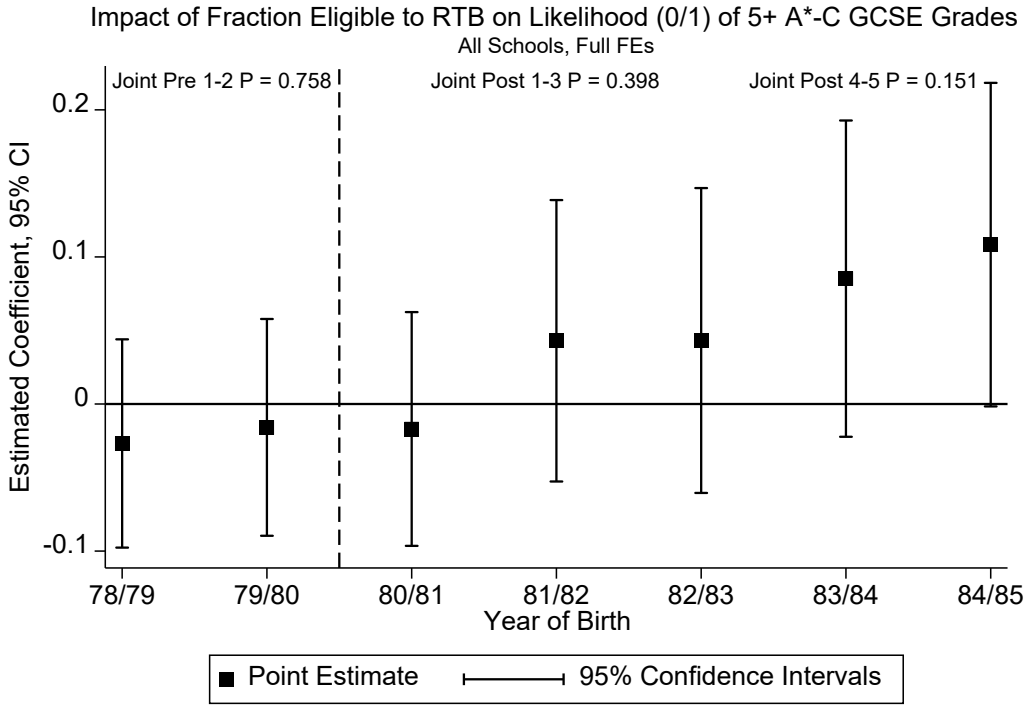
c) RTB Public Housing Sales (% 1980 Public Housing Stock)



Notes: Data from 344 Local Authority (LA) Districts. Panel A shows total RTB public housing sales in the period 1980-1992 as a percentage of the 1980 residential stock in the LA. Panel B shows a count of total RTB public housing sales over the period 1980-1992 in the LA. Panel C shows total RTB public housing sales in the period 1980-1992 as a percentage of the 1980 public housing stock in the LA.

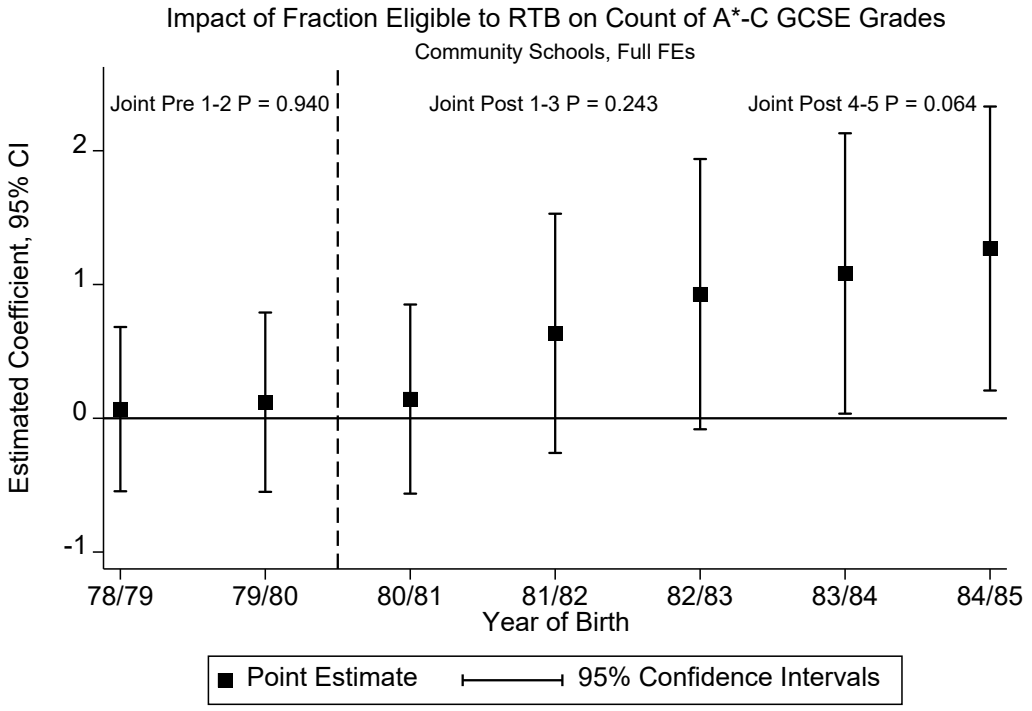
Figure A5. Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams

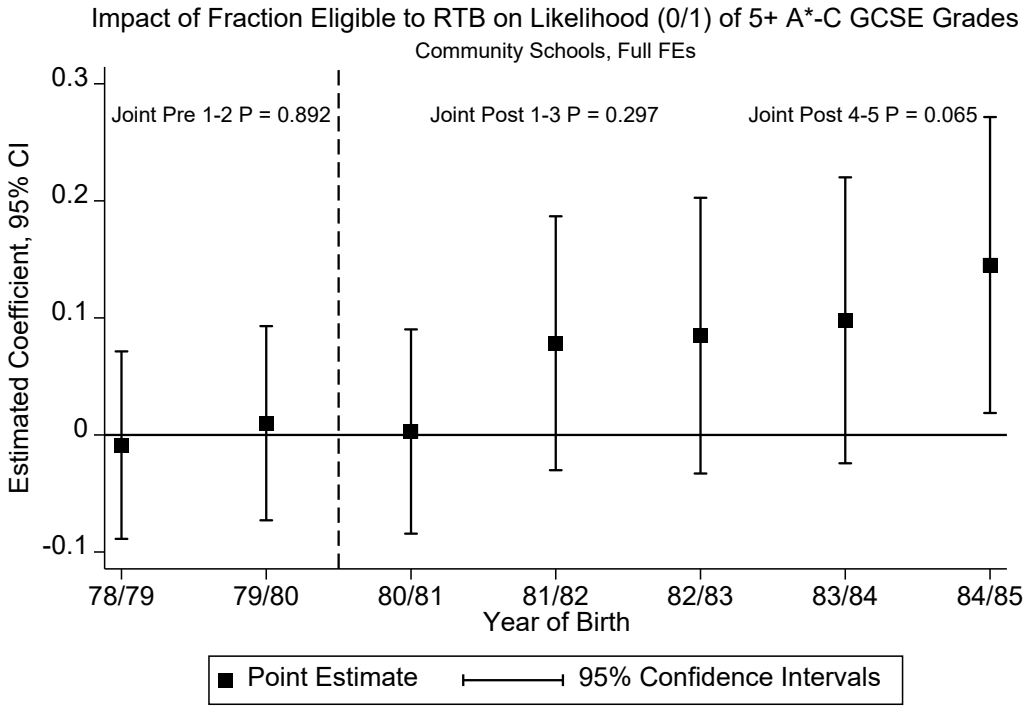




Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85. ITT variable measured as fraction of households eligible for RTB in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

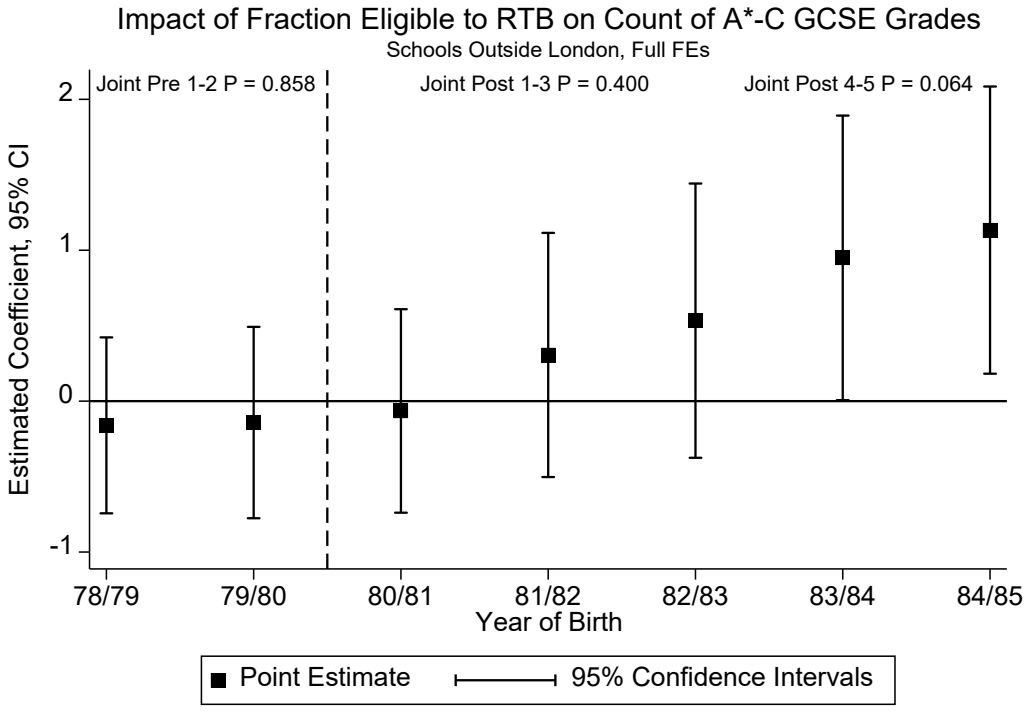
Figure A6. Robustness Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in Community Schools

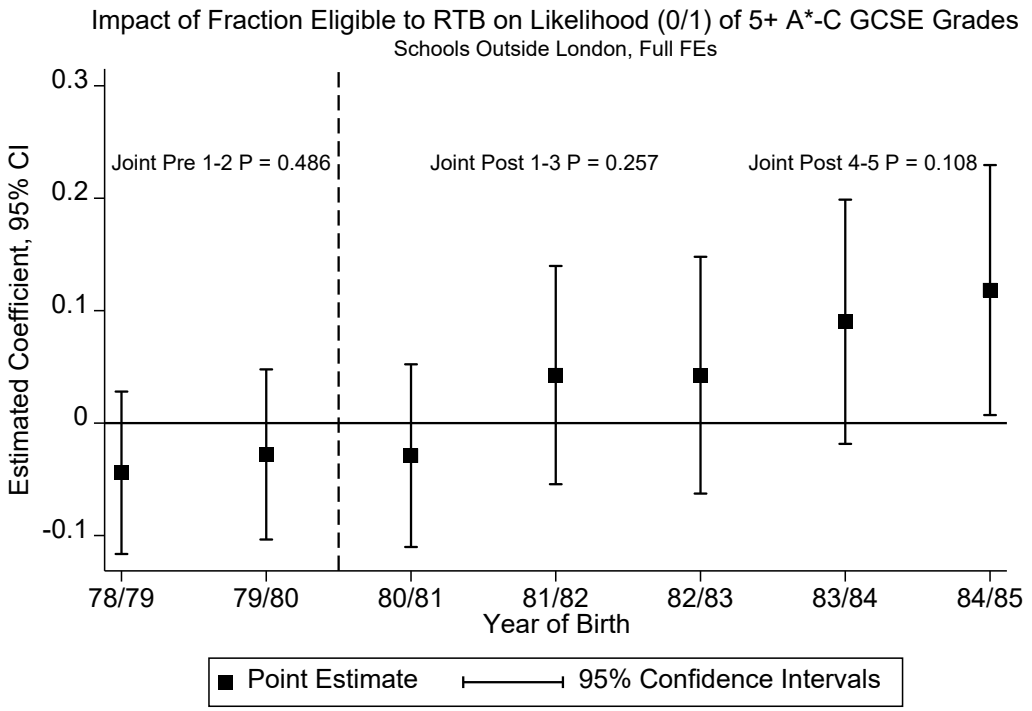




Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in community schools. Analysis includes pupils born in 1977-85. ITT variable measured as fraction of households eligible for RTB in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

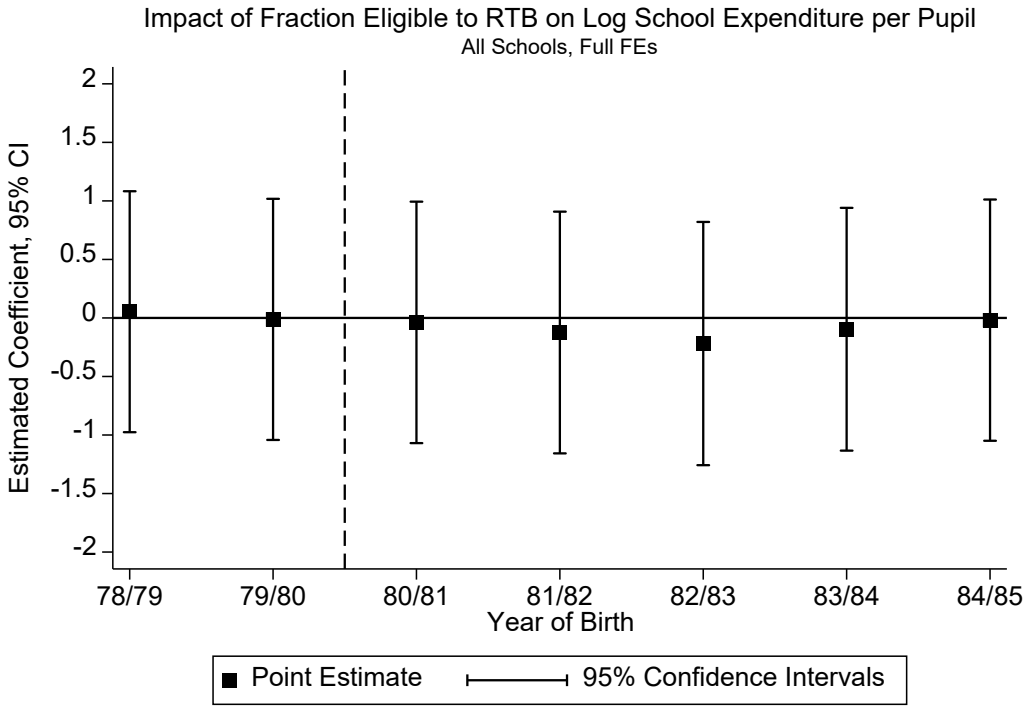
Figure A7. Robustness Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in Schools Outside Greater London





Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in schools outside Greater London. Analysis includes pupils born in 1977-85. ITT variable measured as fraction of households eligible for RTB in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

Figure A8. Event Study Estimates of Impact of Right-To-Buy (RTB) Scheme on Log School Expenditure per Pupil



Notes: Figure shows Intention-To-Treat (ITT) estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on (log) school expenditure per pupil. Analysis includes pupils born in 1977-85. ITT variable measured as fraction of households eligible for RTB in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors are clustered at school level. Estimated specification controls for: Female Fixed Effects (FE), Year of Birth (YoB) FE, School FE, School FE x Female FE, Yob x Female FE x School Type FE, Local Area Circumstances, YoB FE x Local Area Circumstances, Female FE x Local Area Circumstances, School Type FE x Local Area Circumstances. Local Area Circumstances are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977.

Table A1. Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in All Schools by Gender

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	ITT	IV	ITT	IV	IV
		ITT = Average Length of Tenure				
		IV = RTB Sales in 1980				IV = RTB Sales in 1980-92
		Count of A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.086	0.013	0.305	0.019	0.324	0.136
	(0.033)	(0.008)	(0.199)	(0.009)	(0.176)	(0.072)
(RTB Sales 1980-81) x Post x Female	0.035	0.007	0.137	0.009	0.171	0.040
	(0.034)	(0.008)	(0.190)	(0.008)	(0.184)	(0.046)
% Effect	2.326%	0.352%	8.248%	0.514%	8.761%	3.678%
% Effect Female	0.946%	0.189%	3.705%	0.243%	4.624%	1.082%
Elasticity (10%)	0.084%	0.381%	0.299%	0.556%	0.318%	2.568%
Elasticity (10%) Female	0.034%	0.204%	0.134%	0.263%	0.168%	0.755%
Mean Dep Var 1977-80	3.698	3.698	3.698	3.698	3.698	3.698
		Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.009	0.001	0.031	0.002	0.036	0.014
	(0.004)	(0.001)	(0.023)	(0.001)	(0.021)	(0.008)
(RTB Sales 1980-81) x Post x Female	0.004	0.000	0.004	0.001	0.008	0.002
	(0.004)	(0.001)	(0.023)	(0.001)	(0.022)	(0.005)
% Effect	2.350%	0.261%	8.094%	0.522%	9.399%	3.655%
% Effect Female	1.044%	0.000%	1.044%	0.261%	2.089%	0.522%
Elasticity (10%)	0.085%	0.282%	0.294%	0.565%	0.341%	2.552%
Elasticity (10%) Female	0.038%	0.000%	0.038%	0.282%	0.076%	0.364%
Mean Dep Var 1977-80	0.383	0.383	0.383	0.383	0.383	0.383
Female FE	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y
School FE	Y	Y	Y	Y	Y	Y
School FE x Female FE	N	N	N	Y	Y	Y
Yob x Female FE, School Type, Local Area Circumstances	N	N	N	Y	Y	Y
Female FE x Local Area Circumstances	N	N	N	Y	Y	Y
Sample Size	4148468	4148468	4148468	4148468	4148468	4148468
Number of Schools	3440	3440	3440	3440	3440	3440

Notes: Table shows estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. RTB Sales are measured in 1980 in the Local Authority (LA) of the school where GCSE exams are taken as a % of the residential stock in 1980. The Intention-To-Treat (ITT) variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors clustered at school level are reported in parentheses. Control variables are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table A2. Estimates of Impact of Right-To-Buy (RTB) Scheme on Student Performance in GCSE Exams in Schools Outside Greater London

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	ITT	IV	ITT	IV	IV
		ITT = Average Length of Tenure				
		IV = RTB Sales in 1980				IV = RTB Sales in 1980-92
		Count of A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.118	0.039	0.876	0.033	0.644	0.147
	(0.030)	(0.009)	(0.236)	(0.009)	(0.200)	(0.052)
% Effect	3.161%	1.045%	23.466%	0.884%	17.252%	3.938%
Elasticity (10%)	0.119%	1.163%	0.885%	0.984%	0.650%	2.771%
Mean Dep Var 1977-80	3.733	3.733	3.733	3.733	3.733	3.733
Mean Expl Var	0.377	11.126	0.377	11.126	0.377	7.037
		Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams				
(RTB Sales 1980-81) x Post	0.013	0.004	0.096	0.004	0.070	0.016
	(0.004)	(0.001)	(0.028)	(0.001)	(0.024)	(0.006)
% Effect	3.351%	1.031%	24.742%	1.031%	18.041%	4.124%
Elasticity (10%)	0.126%	1.147%	0.933%	1.147%	0.680%	2.902%
Mean Dep Var 1977-80	0.388	0.388	0.388	0.388	0.388	0.388
Mean Expl Var	0.377	11.126	0.377	11.126	0.377	7.037
Female FE	Y	Y	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y	Y	Y
School FE	Y	Y	Y	Y	Y	Y
School FE x Female FE	N	N	N	Y	Y	Y
Yob x Female FE, School Type, Local Area Circumstances	N	N	N	Y	Y	Y
Female FE x Local Area Circumstances	N	N	N	Y	Y	Y
Sample Size	4148468	4148468	4148468	4148468	4148468	4148468
Number of Schools	3440	3440	3440	3440	3440	3440

Notes: Table shows estimates of the causal effect of Right-To-Buy (RTB) Public Housing Sales on student performance in General Certificate of Secondary Education (GCSE) exams in schools outside Greater London. Analysis includes pupils born in 1977-85 and the Post-period is defined at the individual level based on the year of birth (YoB) as starting from 1981. RTB Sales are measured in 1980 in the Local Authority (LA) of the school where GCSE exams are taken as a % of the residential stock in 1980. The Intention-To-Treat (ITT) variable is measured as average years of tenure in public housing in 1980 in the locality of the school where GCSE exams are taken. Robust standard errors clustered at school level are reported in parentheses. Control variables are measured at the LA level in 1981 and include unemployment rate, share of public housing, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table A3. Robustness Estimates of Impact of RTB Scheme on Likelihood of Homeownership and Student Performance in GCSE Exams (BHPS)

	ITT = Fraction Eligible in 1980			
	Likelihood (0/1) of Homeownership During/After a Mortgage	Likelihood (0/1) of Sitting GCSE Exams	Count of A*-C Grades in GCSE Exams	Likelihood (0/1) of 5 or more A*-C Grades in GCSE Exams
ITT x Post	0.695	0.487	7.010	0.853
	(0.222)	(0.212)	(2.435)	(0.371)
% Effect	404.07%	58.463%	153.762%	172.672%
Elasticity (10%)	28.608%	4.139%	10.886%	12.225%
Mean Dep Var 1977-80	0.172	0.833	4.559	0.494
Mean Expl Var	0.708	0.708	0.708	0.708
	Likelihood (0/1) of University Degree	Likelihood (0/1) of Earnings from Labour, Transfer or Investment	Real Earnings from Labour, Transfer or Investment	Real Benefits Received
ITT x Post	0.511	0.603	582.227	-147.252
	(0.224)	(0.279)	(235.676)	(65.633)
% Effect	280.769%	73.897%	148.793%	-486.767%
Elasticity (10%)	19.878%	5.232%	10.535%	-34.463%
Mean Dep Var 1977-80	0.182	0.816	391.299	30.251
Mean Expl Var	0.708	0.708	0.708	0.708
Female FE	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y
Local Area FE	Y	Y	Y	Y
Local Area FE x Female FE	Y	Y	Y	Y
Survey Year FE	Y	Y	Y	Y
Survey Year FE x Female FE	Y	Y	Y	Y
Yob x Female FE, Local Area Circumstances	Y	Y	Y	Y
Female FE x Local Area Circumstances	Y	Y	Y	Y
Sample Size	3568	3568	3568	3568
Number of LAs	225	225	225	225

Notes: Table shows Intention-To-Treat (ITT) estimates of the causal effect of eligibility to the Right-To-Buy (RTB) Public Housing Sales Scheme on the count of A*-C Grades in General Certificate of Secondary Education (GCSE) Exams. Analysis includes pupils born in 1975-85 and Post-period defined at the individual level based on year of birth (YoB) as starting from 1981. ITT variable measured as average years of tenure in public housing in 1980 in locality of birth. Robust standard errors clustered at Local Authority (LA) level are reported in parentheses. Earnings from Labour, Transfer or Investment and Real Benefits measured in the last month. Control variables measured at LA level in 1981 and include unemployment rate, fraction of population aged 15-24, share of public housing, share of public flats, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.

Table A4. Robustness Estimates of Impact of RTB Scheme on Likelihood of Earnings from Labour, Migration and Marriage (BHPS)

	ITT = Fraction Eligible in 1980			
	Likelihood (0/1) of Earnings from Labour	Real Earnings from Labour	Likelihood (0/1) of Migration Away from LA of Birth	Likelihood (0/1) of Marriage
ITT x Post	0.627	501.803	0.352	0.017
	(0.299)	(220.878)	(0.410)	(0.106)
% Effect	98.740%	144.823%	71.111%	48.571%
Elasticity (10%)	6.991%	10.253%	5.035%	3.439%
Mean Dep Var 1977-80	0.635	346.495	0.495	0.035
Mean Expl Var	0.708	0.708	0.708	0.708
	Count of Own Children	Likelihood (0/1) of Extra Loan	Likelihood (0/1) of Extra Loan for a Car or Other Purchase	Likelihood (0/1) of Extra Loan to Extend or Improve Home
ITT x Post	0.115	0.344	0.025	0.349
	(0.610)	(0.096)	(0.056)	(0.122)
% Effect	20.499%	747.826%	227.273%	894.872%
Elasticity (10%)	1.451%	52.946%	16.091%	63.357%
Mean Dep Var 1977-80	0.561	0.046	0.011	0.039
Mean Expl Var	0.708	0.708	0.708	0.708
Female FE	Y	Y	Y	Y
Year of Birth (YoB) FE	Y	Y	Y	Y
Local Area FE	Y	Y	Y	Y
Local Area FE x Female FE	Y	Y	Y	Y
Survey Year FE	Y	Y	Y	Y
Survey Year FE x Female FE	Y	Y	Y	Y
Yob x Female FE, Local Area Circumstances	Y	Y	Y	Y
Female FE x Local Area Circumstances	Y	Y	Y	Y
Sample Size	3568	3568	3568	3568
Number of LAs	225	225	225	225

Notes: Table shows Intention-To-Treat (ITT) estimates of the causal effect of eligibility to the Right-To-Buy (RTB) Public Housing Sales Scheme on educational and youth labour market outcomes. Analysis includes pupils born in 1975-85 and Post-period defined at the individual level based on year of birth (YoB) as starting from 1981. ITT variable measured as average years of tenure in public housing in 1980 in locality of birth. Robust standard errors clustered at Local Authority (LA) level are reported in parentheses. Earnings from Labour measured in the last month. Control variables measured at LA level in 1981 and include unemployment rate, fraction of population aged 15-24, share of public housing, share of public flats, share of flats and share of Conservative votes in 1977. % Effects calculated as estimated coefficients divided by mean of dependent variable in ITT control group born before 1981.