Seeking opportunity or socioeconomic status?
Housing and school choice in Sweden

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Abstract

Residential choices and school choices are intimately connected in school systems where school admission relies on proximity rules. In countries with universal school choice systems, however, it remains an open question whether families' residential mobility is tied to the choice of their children's school, and with what consequences. Using administrative data on all children approaching primary-school age in Sweden, we study to what extent families' financial and socioeconomic background affects mobility between neighbourhoods and the characteristics of schools chosen by moving families. Our findings show that families do utilize the housing market as an instrument for school choice over the year preceding their firstborn child starting school. However, while families who move do 'climb the social ladder' by moving to neighbourhoods with more households of higher socioeconomic status, their chosen schools do not appear to be of higher academic quality compared to those their children would otherwise have attended.

Keywords

Residential mobility, school choice, welfare state, school enrolment, housing market

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Introduction

Educational choices and outcomes are intimately connected to family characteristics such as income, wealth, and parents' education (Björklund and Salvanes, 2011; Coleman, 1968). In cities where school choice is shaped by residential location, family wealth and income play a crucial role in enabling access to schools of higher academic quality through the housing market. Whereas wealthier families have the financial means to relocate, low-income families tend to have less flexibility in both residential and school choices (Cuddy et al., 2020; Holme, 2002). It remains an open empirical question, however, whether, in welfare states with school choice systems designed to level the playing field for low-income families, high-income families use residential mobility to choose schools that offer higher academic quality and pupil peer groups of equal or higher socioeconomic status.

For families with young children, residential location and school choices tend to influence each other (Boterman, 2019), with neighbourhoods as the geographic determinant of pupils' educational opportunities (Lareau and Goyette, 2014). In the US, for example, both school and residential choices are strongly driven by families' economic situation, and school choices are largely driven by residential location (Ely and Teske, 2015; Owens, 2016).

A similar close connection between school and residential choices has been noted in European countries, with parents strategically moving to catchment areas where

schools are perceived as better (Boterman, 2019; Butler and Robson, 2003; Kauppinen et al., 2022; Rogne et al., 2021). Whereas parents may prefer 'high-quality schools', such schools are often difficult to identify when accessible information on school effectiveness is limited or biased (Rothstein, 2006; Ainsworth et al., 2023; Beuermann et al., 2023). Hence, some studies note that when relocating to other residential areas, parents may rely on neighbourhood characteristics and pupil peer composition such as racial and socioeconomic characteristics as a proxy for school quality (Abdulkadiroğlu et al., 2020; Billingham and Hunt, 2016; Schachner, 2022).

Yet, there is little research on whether residential choices in welfare states with universal school choice systems are primarily driven by access to schools of higher academic quality or access to peer groups of higher socioeconomic status. Recent findings from the US suggest that school choice systems that are detached from catchment areas can potentially weaken the link between residential and school decisions, as it is often cheaper to choose a school than to relocate (Rich et al., 2021). A conjoint experiment analysis by Thelin and Niedomysl (2015), however, shows that in Sweden, geographical proximity remains a significant factor in school choice decision-making. Given the still-relevant geographical aspect, Thelin and Niedomysl (2015) observe that it is plausible that parents with young children may seek to relocate to neighbourhoods perceived as providing a more favourable schooling environment for

their children (Bernelius and Vaattovaara, 2016; Cuddy et al., 2020; Hastings et al., 2005; Holme, 2002).

In this study, we focus on residential and school choices in Sweden – a theoretically consequential setting given the country's combination of a comprehensive welfare state and a universal school choice policy. Despite universal school choice policies, public school admissions in Sweden rely on proximity-based allocation rules. Increasing income inequalities and residential segregation (Mutgan and Mijs, 2023; OECD, 2015b) thus raise the question of whether parents in Sweden also utilize the housing market as a key channel for selecting schools – and, if so, what types of schools they choose.

Our study sets out to answer three research questions: (1) *To what extent do families relocate to new neighbourhoods as their children approach school age? (2) What family-level characteristics predict residential mobility? (3) Do the schools attended by children in relocating families differ from the schools they would have attended if they had not moved?*

Using full-population administrative data, we study whether families of children close to school age differ in geographic mobility behaviour based on income and wealth, and to what extent moving allows children to access pupil peer groups with higher socioeconomic status and schools of higher academic quality. We analyse differences in mobility behaviour among families whose eldest child is five and six years old using logistic regressions. Further, we use propensity score matching to compare school

characteristics for children who relocate to new neighbourhoods with those who stay. We do so in order to understand what types of schools parents deem as most attractive when relocating, and how these schools differ from those they would otherwise have attended in terms of peer-group socioeconomic status, test scores, and test scores adjusted for peer-group socioeconomic status, which we use as a proxy for school value-added.

How do parents choose schools?

Studies from Sweden, the UK, the Netherlands, and the US suggest similarities in families' school choice patterns. Parents prefer schools where peer composition roughly reflects their own socioeconomic status and ethnic/racial background (Hastings et al., 2005; Burgess et al., 2015). Especially for families with high socioeconomic status, these preferences tend to proxy for 'better schools' (Schneider and Buckley, 2002; Denessen et al., 2005; Malmberg et al., 2014; Billingham and Hunt, 2016). Perhaps more importantly, parents prefer to send their children to schools close to their home (Andersson et al., 2012; Collins and Snell, 2000; Schneider and Buckley, 2002; Mutgan, 2021).

Yet, despite similarities in preferences for certain school characteristics (proximity, perceived quality, pupil peer composition), families face distinct economic and spatial constraints when choosing both residential location and school. While low-income families with young children tend to move more often, these moves are less likely to be

out of areas of poverty during their children's early years (Gambaro et al., 2017). The geographic mobility of low-income families tends to be attached less to preferences for certain schools and more to circumstances driven by exogenous shocks such as unemployment, changes in family situation, or housing instability (Lareau and Goyette, 2014; DeLuca et al., 2019). Hence, economic constraints limit low-income families' residential choices, and in turn, proximity-based allocation rules and proximity preferences mean that these families have limited access to school choices (Burgess and Briggs, 2010; Rich and Owens, 2023). Conversely, while high-income families are more likely to relocate to areas with better living conditions (Gingrich and Ansell, 2014; Clark and Ledwith, 2007), it is not certain whether these areas always provide better schools compared to these families' previous residential locations.

The link between school and residential choices in Sweden

In 1992, Sweden went through major education reforms including the introduction of universal school choice and independent schools, which were funded by a voucher-like system (Böhlmark and Lindahl, 2015). Independent schools are either for-profit or non-profit establishments and are not allowed to charge tuition but receive funding from the respective municipalities for each pupil attending. In the 2015/16 school year, 17% of primary schools were independently run (Swedish National Agency for Education, 2023).

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Under universal school choice for elementary and lower secondary schools in Sweden, parents may freely apply to schools within their municipality of residence. Due to their limited capacities, however, schools employ various allocation rules. Independent schools follow a first-come-first-served principle (Musset, 2012), while municipalities use proximity-based allocation rules for public schools based on the distance between the school and children's homes. Since municipalities must ensure that all children have a place in a nearby school, children are guaranteed a spot in a nearby designated municipal school regardless of whether their family applies for any specific school (Skollag, 2010:800). In parallel to these changes in the Swedish education sector, differences in pupil achievement across school areas have increased (Holmlund et al., 2019; Östh et al., 2013), which may incentivize indirect school choice via residential choice.

Residential mobility, however, is highly dependent on households' economic situation. Although Sweden has long been regarded as one of the most equal societies in the world, income inequality has risen rapidly over the last three decades (OECD, 2015b) and so has residential income segregation, especially among families with children (Mutgan and Mijs (2023). Sweden has also transformed into a multicultural society (Statistics Sweden, 2022). Between 2000 and 2018, the proportion of children aged 7–15 born outside the country or with two foreign-born parents increased from 14.1% to 25.3%. The spatial concentration of subsidized rental housing in certain neighbourhoods,

as well as income inequality between Sweden- and foreign-born individuals, further contributed to income and ethnic segregation (Andersson et al., 2022).

While a large rental market should imply more equal access to affordable housing, Sweden's rent control system and a lack of tenant housing constrain mobility, especially for younger households (Öst et al., 2014). Further, rapid urbanization has led to a shortage of housing and an increase in real-estate prices, creating long queues for tenant housing and a 'black market' in the rent-controlled housing market (Christophers, 2013; Öst, 2012b). Those who seek to relocate are thus channelled toward the market for condominiums (i.e., buildings of separately owned apartments) and single-family houses. Couples' past homeownership and earned income have been linked to the simultaneity of first-time homeownership and childbirth (Öst, 2012a; Öst, 2012b). With the distribution of wealth and liquid assets skewed towards the top of the income distribution (Andersson and Vestman, 2021; Lundberg and Waldenström, 2018), many households cannot afford to buy a home. Hence, residential mobility is more accessible for families who can utilize their income and wealth to access educational opportunities for their children.

This rise in income inequality and changes in housing market conditions may also have transformed the indirect market for education, with the housing market becoming more important (Holmlund et al., 2019). This motivates our empirical focus on studying how Swedish families utilize the housing market in relation to school enrolment.

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Figure 1 indicates that it is more common for families to move home before their child starts school than in subsequent years. While some of these mobility events may be driven simply by a search for more spacious housing (Öst, 2012a), choice of destination will likely depend on families' economic constraints as well as their school preferences.
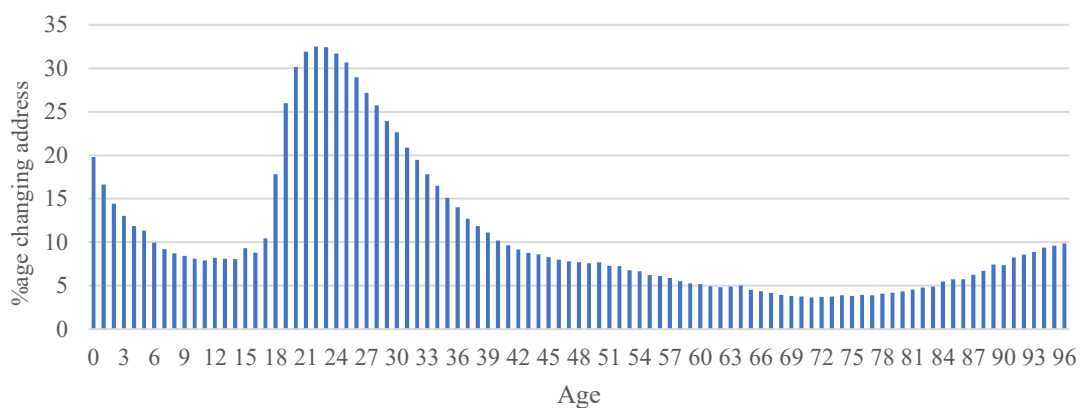
Figure 1. Percentage of Swedish individuals who change address between 2014 and 2015, by age. Source: Total population registers, own calculations

Data, geographical areas, and family types

Data

To answer our research questions, we use a set of individual-level yearly data collated for us by Statistics Sweden, including residential locations (with dependent children registered at the same address), parents' income and education, and country of birth, as well as elementary school data (from preschool until ninth grade) showing the school at which each pupil was enrolled on October 15 each year. The Swedish National Agency

of Education provides test scores in maths and Swedish national exams among third-grade pupils in each school, which is the first occasion pupils take a national exam.

Population

The study population is constructed in three steps. First, we select all families with an eldest child aged five or six in 2014 in the whole of Sweden. This allows us to isolate the family's decision to move in relation to the situation of their eldest child.[2] Second, we exclude families whose moves were prompted by the parents separating during 2014–2015.[3] Third, we exclude families who moved to a different municipality (n=2,189) or within the same neighbourhood (n=1,218). Moves between municipalities are mainly attributed to one of the parents having obtained a new job, while a move within a neighbourhood could be attributed to reasons related to housing rather than school choice.[4] Our final population consists of 37,800 families where the eldest child turned

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[2] This identification strategy is chosen to maximize the discontinuity in family behavior between those children who have started school and those who have yet to do so, given control variables. Further, in Sweden, siblings are given priority in school admission processes, making it vital for families to place their first child at their preferred school.

[3] Family separation is indicated by parents no longer being registered in the same household in 2015. We also exclude single-parent households While the inclusion of single-parent households can impart richness to the analysis by encompassing heterogeneous family constellations in the sample, it also makes it difficult to draw inferences for a larger population due to wide income differences between single- and dual-parent households.

[4] As described below, we use electoral constituencies as our neighbourhood definition. Moves *between* constituencies typically present an opportunity to enrol in new schools, whereas relocations *within* constituencies may indicate a preference for the local school. Because we cannot ascertain whether such local moves are motivated by school-related considerations or other factors, we decided to exclude them.

five, and 37,300 where the child turned six, during 2014. Out of these, 3,504 (4.7%) families moved between 2014 and 2015.

Defining neighbourhoods

Among all first-grade pupils in Sweden in 2017, the median home-to-school distance was just 728 meters, and 86% of first-graders attended one of the three closest schools to their home (63% to the nearest). 95.5% of the pupils who went to their nearest school attended a public (i.e., municipality-run) school. These statistics suggest that parents overwhelmingly prefer neighbourhood schools. Sweden, however, does not have school catchment areas. To study mobility across neighbourhoods and to rely on a relatively balanced population within neighbourhoods with non-overlapping neighbourhoods for schools, we use electoral constituencies as a proxy for neighbourhoods. Swedish electoral constituencies are created by the authorities such that there are between 1,000 and 2,000 eligible voters in each area, depending on the population density of the wider region. In our data, there are a maximum of 100 five- and six-year-olds in each constituency. In 2014, there were a total of 5,837 constituencies in Sweden, about half (2,884) containing at least one school.[5] Some constituencies in rural areas may have no school at all, yet families may still choose to move there if there are other schools nearby. We thus include also these areas, as mobility between constituencies is likely to provide access to new

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[5] The electoral constituencies are designed to include a 'polling station' that often corresponds with a public school (Vallag, 2005:837). There are also a few constituencies with more than one school (392 of 5,837 constituencies in our data). A sensitivity analysis where we dropped constituencies with more than one school revealed no substantial differences.

schools. We rely on this smaller-scale definition of neighbourhoods based on constituencies, given parents' preferences for nearby schools for their young children, proximity-based allocation rules, and the fact that younger pupils travel much shorter distances to school than older pupils (Mutgan, 2021).

Family types

We classify neighbourhoods and families with children into two dimensions: one representing the socioeconomic conditions of the neighbourhood compared to the municipality and another reflecting the family's socioeconomic status relative to other households in their neighbourhood. Social conditions in the neighbourhood are measured using *higher or lower proportion of gainfully employed residents* among working-age residents (aged 20–64) relative to the municipality average.[6] To capture families' relative financial situation, we measure whether all salary-earning family members have a *higher or lower yearly earned income* relative to average annual earnings in the neighbourhood.[7]

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[6] Gainfully employed residents constitute those who earn income through either employment or self-employment, thus excluding individuals who receive pupil aid or a pension or have no income at all. We refer to this as 'gainfully employed' to reflect the terminology used by Statistics Sweden. The *proportion of gainfully employed residents* in a neighborhood is a proxy for the extent of social problems in the area (Chiricos, 1987; Edmark, 2005). We use a relative measurement against the municipality average since absolute measurements would not account for factors such as natural constraints in the local labor market.

[7] An alternative measure would be to compare *earned income* relative to average annual earnings in the *municipality*, which would capture housing prices and cost of living both where families *move from* and where they *move to*. However, the large correlation between income and social conditions relative to the municipality mean that systematically different family types cannot be distinguished if families' earned income is measured relative to the municipality mean.

These two dimensions allow us to index the results across four 'family types' (A–D). Type A denotes families residing in neighbourhoods characterized by a low percentage of gainfully employed residents with low earnings (7,300 families). Type B refers to neighbourhoods with a low proportion of gainfully employed residents with high earnings (15,500 families). Type C refers to neighbourhoods with a high proportion of gainfully employed residents with low earnings (17,000 families). Finally, Type D represents neighbourhoods with a high proportion of gainfully employed residents with high earnings (35,300 families).

Empirical strategy

Our analyses follow a two-step research strategy. First, to analyse the likelihood of neighbourhood mobility as the child approaches school age and the family characteristics that influence this decision, we apply logistic regressions:

$$\Pr\left(Move_{t+1,j} = 1 | x_{it,j}\right) = G\left(\alpha_j + \beta_{1,j} Child\ is\ five\ years\ old_j + \delta X_{it,j}\right)$$

where G(.) is a known function and j refers to four family types based on two dimensions: the social conditions of the neighbourhood relative to the municipality and the family's economic situation relative to their neighbourhood. X_{it} refers to the vector of family-level income and housing characteristics in year t, described in Appendix 1. We also include a dummy variable indicating whether the child is five or six years old. The multiple logistic regression allows us to simultaneously examine our variables conditioned not

only on an opportunity constraint in the form of income but also a 'push' factor in the form of social conditions in the neighbourhood.[8]

Second, to examine whether the schools that children attend in their new neighbourhood have different characteristics from those they otherwise would have attended, we employ propensity score matching (PSM). Since we cannot know which school parents would have preferred for their children had they not moved, we create a counterfactual population (a control group) for relocating families. Each relocating family is matched with a 'twin family' who did not move but resemble the relocated family as closely as possible in terms of the family background variables used in the logistic regression. We further include dummy variables for each family type (A–D) in the matching procedure. After estimating a propensity score, the algorithm matches families according to the one-to-one nearest-neighbour matching technique (Becker and Ichino, 2002).[9] Using these matched families, we compare the socioeconomic status (proportion of parents in the pupils' school cohort with post-secondary education and proportion of parents born abroad) of 'new' schools (schools attended by the relocating family) to the counterfactual schools that pupils would have attended (school attended

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[8] An alternative could be a three-level interaction.

[9] The Common Support Condition (CSA) in the PSM framework requires that given the control variables X, families with the same X-values should have an equal opportunity (positive) of being assigned to either the treated or control groups (Becker and Ichino, 2002). We account for this condition by requiring that the means of all control variables do not deviate by more than 10% between the groups (treated and control). We examine this, as well as PSM balancing tests, in Appendix 3. We also conduct a robustness test where matching is based on Mahalanobis distance in Appendix 4.

by counterfactual group) had they not moved, to examine potential differences in pupil peer group socioeconomic status. In addition to socioeconomic status, we also compare third-grade pupils' test scores between their new schools and counterfactual schools to examine potential differences in academic performance.

Finally, we use regression analysis to control for the effects of the peer groups' socioeconomic status on the test scores. We then study the residual of the regression model to proxy academic quality, i.e., the potential 'value-added' (Hanushek, 1971; Meyer, 1997) of the schools themselves, beyond what can be inferred from test scores. We again compare this measure of academic quality between 'new schools' and ' counterfactual schools'.

Our analyses assume that mobility between neighbourhoods also provides access to new schools, given the bundled nature of the schools and neighbourhoods. Since some constituencies have no school, and families may also move to one of these constituencies, we compare the actual attended school with the counterfactual school. We believe this is a valid comparison, given that most first-graders attend a school near their home.

Results

Are families more likely to move as their children approach school age?

Table 1 shows mobility rates of the four family types. Overall, 4.7% of families changed residential neighbourhoods between 2014 and 2015. The proportion of families who

move is higher among families with five-year-olds in all family types except family Type A, indicating that parents are more likely to move before school commencement, and that low-income families are likely to have less stable living conditions.

Table 1. Proportion of families with children moving between neighbourhoods, 2014

	Lower proportion of gainfully employed		Higher proportion of gainfully employed		
	Lower earned income	Higher earned income	Lower earned income	Higher earned income	All families
	(A)	(B)	(C)	(D)	
Percentage of families who move	7.2%	7.1%	3.9%	3.5%	4.7%
Families with 5-year-olds who move	7.5%	8.0%	4.4%	4.0%	5.6%
Families with 6-year-olds who move	6.8%	6.1%	3.5%	3.0%	4.1%
Difference between 5- and 6-year-olds	0.6%	2.0%***	0.9%***	1.0%***	1.2%***
Number of families	7,300	15,500	17,000	35,300	75,100

Note: 'Lower/higher share of gainfully employed' refers to the ratio of gainfully employed residents in the neighbourhood compared to the ratio of gainfully employed residents in the municipality. 'Lower/higher earned income' refers to total family income compared to the neighbourhood average. *** Significant at the 1% level in t-tests.

To examine heterogeneity among families and study potential determinants of mobility, we estimate four logistic regression models that account for factors related to family housing conditions, demographics, and socioeconomic conditions. Table 2 reports average marginal effects (AMEs) for the probability of moving by family type.[10]

Controlling for a range of family, housing, and neighbourhood characteristics, results in Table 2 below show that families of Types B and D are more likely to move

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[10] Marginal effects at the median show the marginal change in probability of moving for a one-unit change in each predictor variable, given that the other variables are set to the median value.

between neighbourhoods the year before their eldest child starts school (*Child is five years old* = 1) compared to families whose children are six years old. We also find that if families are living in a rental apartment or have a smaller house than average, they are more likely to move to a new neighbourhood. Degree of urbanization matters for Type A families, who are more likely to move within a larger city – potentially due to higher turnover in housing compared to the countryside.

When examining the dimensions that separate the family types from each other, our results show that income is a strong predictor of moving between neighbourhoods: having a higher relative income compared to the neighbourhood mean increases the probability of moving. Further, neighbourhood social conditions seem to matter as a push factor for those families with relatively higher income: Type B families (who live in neighbourhoods with a lower-than-average share of gainfully employed but earnings above the neighbourhood mean) have a 1% higher probability of relocating compared to Type D families (who reside in neighbourhoods with a higher-than-average share of gainfully employed and earnings also above the neighbourhood mean). This effect does not hold for lower-income families, with no difference between family Types A and C.

Table 2. Probability of moving by family type, average marginal effects (AMEs)

	Lower proportion of gainfully employed than municipality		Higher proportion of gainfully employed than municipality	
	Lower earned income	Higher earned income	Lower earned income	Higher earned income
	(A)	(B)	(C)	(D)
Child is five years old	0.004	0.013**	0.003	0.002***
	(0.01)	(0.00)	(0.00)	(0.00)
Living space is smaller than average	0.024*	0.063***	0.009***	0.010***
	(0.01)	(0.01)	(0.00)	(0.00)
Rental	0.012	0.034***	0.008***	0.006***
	(0.01)	(0.01)	(0.00)	(0.00)
Large city	0.017**	0.002	0.001	0.003***
	(0.01)	(0.00)	(0.00)	(0.00)
Eldest child is a girl	-0.000	-0.001	0.001	0.001
	(0.01)	(0.00)	(0.00)	(0.00)
Parents' age	-0.003***	-0.004***	-0.001***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)
Parents' earned income (log)	-0.001	0.036***	-0.000*	0.003***
	(0.00)	(0.01)	(0.00)	(0.00)
Parents have post-secondary education	0.000	0.008	0.001	0.001
	(0.01)	(0.00)	(0.00)	(0.00)
Foreign-born parents	-0.023*	0.003	0.002	0.003***
	(0.01)	(0.00)	(0.00)	(0.00)
Younger siblings	-0.012	-0.020***	0.000	-0.001
	(0.01)	(0.00)	(0.00)	(0.00)
Household wealth 2006 (log)	-0.002**	-0.001	-0.001***	-0.000***
	(0.00)	(0.00)	(0.00)	(0.00)
Grandparents' wealth 2006 (log)	-0.001	-0.000	-0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Family capital gains t-1 (log)	0.002***	0.002***	0.001***	0.000***
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	7,295	15,530	16,957	35,348
Pseudo R2	0.031	0.077	0.082	0.107

Note: 'Lower or higher share of gainfully employed' refers to the ratio of gainfully employed residents in the neighbourhood compared to the ratio of gainfully employed residents in the municipality. 'Lower or higher earned income' refers to the family's total income compared to the average income of the neighbourhood. Standard error in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Among the four income- and wealth-related variables in Table 2, *parents' earned income* is the most important. A 1% increase in earned income increases the probability of relocating by 3.6% for Type B families and by 0.3% for Type D. However, a 1% increase in *capital gains* increases the probability of relocating by only 0.1–0.2% for all family types. Neither of the two lagged variables *Grandparents' wealth* or *Household wealth* has a positive impact on the probability of moving, indicating either that extended family wealth is not broadly related to families' credit constraints or that the eight-year lags of these variables fail to capture the impact of such income for mobility.

In sum, Table 2 highlights that families are more likely to move before their first child starts school, even after we control for a range of factors. Overall, our results highlight that families seem to move for housing practicalities as well as when their income permits it. As families' capital gains and earned income increase, they become more likely to relocate. This is especially so for Type B families. On the other hand, family wealth and grandparents' wealth seem not to affect mobility. Still, these regression models do not allow us to rule out the other potential unobserved factors driving this behaviour.

Do relocating children's schools differ from those they would otherwise have attended?
It is not possible to determine exactly *why* families move, either theoretically or methodologically. Yet, using detailed background data on pupils' families, we can assess

the extent to which parents are searching for a school with different characteristics and probe whether schools differ in terms of the pupils' socioeconomic status (parental employment, education level, or foreign background) and also whether children in these schools perform better at standardized exams. To test this, we use a PSM approach and identify 3,205 families who moved and 3,205 in a comparable control group who did not move.

Table 3 shows differences in the school characteristics between the relocating families and their matched 'twin families'. Results indicate that children who move have peers of higher socioeconomic status in their new schools compared to the schools attended by the control group. Movers on average attend schools with a 1.2% higher share of gainfully employed parents, a 2.4% higher share of parents with post-secondary education, and a 2.8% lower share of parents with a foreign background.

When examining differences in test scores, the schools to which families relocate seem to perform slightly better in both mathematics and Swedish, which is expected given the association between socioeconomic background and pupil performance (Coleman, 1968; Björklund and Salvanes, 2011). Yet, once we adjust for test scores by the three socioeconomic variables, we find that the difference (i.e., residual) is not statistically significant.

Table 3. Family composition and test scores in schools selected among relocating families vs matched control families

	Proportion of pupils whose parents:					
Category	Gainfully employed	Post-secondary education	Foreign background	School tests maths	School tests Swedish	**Residual**
Have moved (test group)	85.0%	37.3%	32.5%	90.9	90.6	-0.26
Have not moved (control group)	83.7%	34.9%	35.3%	90.1	89.8	-0.43
Difference	1.2%***	2.4%***	-2.8%***	0.7***	0.8***	0.17

Note: Control group obtained using a PSM procedure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Overall, these results demonstrate that parents who move are more likely to choose neighbourhoods that offer a pupil peer group of higher status than their previous one, rather than schools of higher academic quality.[11] This suggests that families may only consider, or have access to, superficial proxies of 'school quality', and that the financial advantage of moving seems to be limited to the possible effect of having higher-status peers at school.

Discussion and conclusions

While extensive international research examines mobility patterns and the influence of local housing markets on children's schooling opportunities using aggregated data, few studies have been able to observe mobility patterns and school enrolment at the family level. Using longitudinal data on families with children approaching school age, this

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[11] We also rerun the matching procedure based on Mahalanobis distance, with similar results (Appendix 4).

paper adds to the existing literature by examining whether parents utilize the housing market as a means to facilitate their children's enrolment in specific schools.

Among families whose eldest child was five or six years old in our data, almost 5% changed residential location. Based on these families' mobility patterns, our results provide considerable support to earlier studies indicating housing instability among low-income families (Lareau and Goyette, 2014; Gambaro et al., 2017) and show that lower-income families in neighbourhoods with lower proportions of gainfully employed residents than the municipality average have a higher likelihood of relocating (~8%) compared to higher-income families in neighbourhoods with higher proportions of gainfully employed residents (~4%). Beyond family income, we find that parents who are younger, earn more than the neighbourhood average, live in rental housing, and need more space are more likely to relocate.

Our study adds evidence on whether mobility between neighbourhoods is associated with an aspiration to move 'upwards' in terms of school characteristics. Results from the matching models and analyses of residuals show that families' mobility preceding school enrolment is indeed associated with 'social climbing'. That is, families who move access schools with higher socioeconomic status peers compared to those they would have access to had they stayed put. On the other hand, the schools to which these families move offer only ambiguous advantages in academic quality ('value-added') once we adjust for the socioeconomic status of peers.

Housing and school choice in Sweden

These results contribute to research in other countries indicating that affluent families often choose to relocate to specific residential areas with desirable school characteristics such as a peer group with a high social status (Holme, 2002; Kauppinen et al., 2022; Owens, 2016). While Hällsten and Pfeffer (2017) argue that families' ability to 'purchase' educational opportunities in Sweden is limited due to free education and a large regulated rental market, deregulation in the housing market such as ending tenure-neutrality policy has led to a decrease in affordable housing in affluent neighbourhoods, contributing to socioeconomic residential segregation (Turner and Whitehead, 2002; Malmberg and Clark, 2021; Andersson et al., 2022). Given that public school admissions rely on a proximity-based allocation mechanism, there is thus an overlap between school and residential segregation (Mutgan and Tapia, 2023).

From parents' point of view, choosing 'better' neighbourhoods but not necessarily 'better' schools could also signal a strategic choice in the absence of detailed information about schools. Apart from the influence of peers within school settings, the socioeconomic composition of the neighbourhood can also contribute to children's educational outcomes (Andersson and Subramanian, 2006; Andersson et al., 2023). Targeting and accessing schools of high academic quality through relocation may not be possible for all families due to the difficulty of knowing which schools are 'good' for their children, a shortage of housing opportunities, or the number of pupil places available in schools. Our study extends international research showing that families are

more likely to move to neighbourhoods with a favourable socioeconomic backdrop (Ainsworth et al., 2023; Bernelius and Vaattovaara, 2016; Boterman, 2019). However, the decision to move involves push as well as pull factors (Lee, 1966) as well as economic constraints. Given that we do not control for 'pull' factors, our results partly indicate differences in households' choice opportunities. This could be explored in future research as differences in choice opportunities could capture households' active decision to stay in their current neighbourhood.

Although many families relocate for housing reasons, we show that families' earnings are also an important factor in mobility. The effect of income is substantial in magnitude, especially for families who earn more than the neighbourhood average yet live in areas with a lower proportion of employed residents (Type B families), who have a 1% increase in likelihood of moving by earning more than neighbourhood average (compared to Type A families) and a 3% increase in likelihood to move with a 1% increase in absolute income. The size of these effects is probably driven by Sweden's relatively compressed income distribution (OECD, 2015a), where a small income gain results in disproportionally larger changes in relative income between households compared to other countries. This could also be an implication of housing shortages, since it is primarily condominiums rather than rental apartments that allow mobility, given that a stable income is a prerequisite for a family to be able to borrow for a housing purchase. While our measures of absolute wealth are based on past wealth data and may

be underestimated, we do find moderate but stable effects of current capital gains. Given that Swedish households tend to have few liquid assets,[12] these findings suggest that wealth may be less important than income for residential mobility.

Based on our results from the residual analyses, we cannot infer that wealthier families are more likely to utilize the housing market to access higher academic quality. Overall, however, our results show that a higher income enables families to relocate to neighbourhoods that provide access to schools where the peer group is of a higher socioeconomic status compared to stayers. Our findings corroborate the notion of Sweden being in a state of transition between a compensatory welfare state and a system where economic factors matter more for the sorting of individuals across housing, neighbourhoods, and schools (Mutgan and Mijs, 2023; OECD, 2015b).

One interpretation of our results is that families might use socioeconomic indicators as proxies for educational opportunities or that they simply value schools whose pupils have a strong socioeconomic background. In this way, the housing market does indeed function as an instrument for school choice, and income and wealth provide access. Why these families don not target academically higher-quality schools remains an intriguing question; it may just be that the information needed to assess schools' academic quality is imperfect, or that families' preferences are geared toward peer

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[12] 30% of Swedish households hold liquid assets lower than their total disposable income for four months (Andersson and Vestman, 2021).

composition in schools rather than academic achievement. These and other potential explanations provide fertile opportunities for future research on school choice and geographic mobility. With this study, we reveal novel evidence of self-segregation among families whose children are about to start school.

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Appendix 1: Detailed description of variables used in the analysis

Dependent variable

The dependent variable consists of a dummy variable indicating whether or not the family moved to another neighbourhood within the municipality between the years 2014 and 2015.

Family-level independent variables

One of our main independent variables of interest is the dummy variable *child is five years old*, taking the value '1' if the family's eldest child is five years old in 2014, and hence will start the preschool class year in 2015, and '0' otherwise, i.e., the child is six and has already started preschool class.

Two variables are used to measure the current standard of housing. First, we measure whether a family's *living space is smaller than average* using a dummy variable taking the value '1' if a family has less living space than average (i.e., average square metres per family member) and '0' otherwise. Next, we also control for whether the family lives in a *rental* property or not ('1' if the family lives in a rental, '0' otherwise).

We also include data on families' wealth and income to gauge their financial scope to relocate. *Household wealth (2006)* is measured as the logged combined financial holdings (savings and fund/stockholdings accounts, value of property, etc.) of all adult household members, but measured for the individual household members in 2006 (eight years before the measurement year of other variables). This is the last year in which financial data was collected for the overall population in Sweden due to the abolition of wealth taxation and is thus grossly underestimated. We therefore include two other variables. The first is *Family capital gains* (logged) in the year preceding the analysis. This variable proxies for current wealth, but is also sensitive to temporary

shocks (e.g., large increases in wealth due to profitable sales of houses or apartments, inheritances, or stock-market gains). Second, *Grandparents' wealth (2006)* is measured as the logged combined financial holdings of all grandparents (fathers and mothers) of both adult family members (or the adult family members for single-parent households). Grandparents' wealth has been shown to influence the educational outcomes of their grandchildren in Sweden in a study by Hällsten and Pfeffer (2017). This variable also proxies for the socioeconomic background of parents in the household. *Parents' earned income* (combined for both parents, logged) is included to gauge parents' potential to qualify for a mortgage.

Since there is an increasing variation between the supply of schools and pupil mobility between rural and urban regions in Sweden (Fjellman et al., 2019), we also include a dummy reflecting whether the family resides in a *large city* with better access to school choices (>75,000 inhabitants in the municipality). As Kessel and Olme (2018) show that native and high-skilled households are more prone to enrolling in high-performing schools, dummy variables are included capturing whether either of the *parents have post-secondary education* and whether the child has *foreign-born parents*. Finally, we also use dummy variables to control whether the *eldest child is a girl* and whether the child has *younger siblings* alongside a continuous variable of the average of both *parents' age.*

In the second step of our analysis, we also include dummy variables for each of the four family types (A–C, with Type D being the reference category). We do this because the matching procedure requires a good balance of family types across treatment and control groups.

For the residual test, we include gainful employment, post-secondary education, and foreign background together with a variable indicating the share of boys, in line with previous research (Holmlund et al., 2019). These four variables can explain approximately 25–30 % of the variation in the test scores.

Appendix 2

Table 4. Estimating P(X). Logit models of families' probability of moving within a municipality, marginal effects at the median

	Move	
	Marginal effects at the median	z-Value
Child is five years old	0.004***	(5.60)
Living space is smaller than average	0.019***	(20.60)
Rental	0.012***	(-14.26)
Large city	0.004***	(5.64)
Eldest child is a girl	0.001	(1.27)
Parents age	-0.001***	(-14.64)
Parents' earned income (log)	-0.000**	(-3.17)
Parents have post-secondary education	0.004***	(4.65)
Foreign-born parents	0.003***	(3.89)
Younger siblings	-0.004***	(-4.14)
Family type A	-0.006***	(-4.47)
Family type B	0.004***	(4.15)
Family type C	-0.002*	(-2.44)
Constant	-0.857***	(-4.28)
Log likelihood	-11952.78	
Number of obs	68,877	
LR chi^2(48)	2016.32	
Prob > chi^2	0.00	
Pseudo R2	0.0778	

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
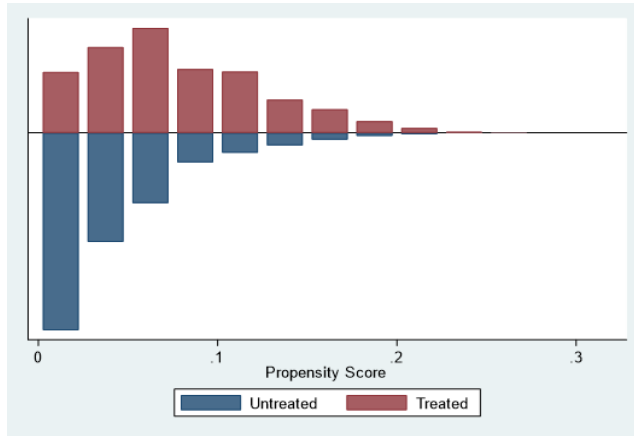

Appendix 3

This appendix provides details of the PSM matching balance. All matching variables have a bias of less than 5%. Assessing the mean difference with a t-test, most variables (10 out of 13) are insignificant, two are significant at the 10% level, and one at the 5% level. For the continuous variables, the variance ratio indicates balance as they are close to 1. The PSM imbalance graph in Figure 2 indicates an overall balanced matching.

Table 5. Mean values, unmatched and matched, for identifying schools

Variable	Treated	Control	% bias	t	p>t	V(T)/V(C)
Child is five years old	0.563	0.555	1.6	0.65	0.513	-
Living space is smaller than average	0.783	0.805	-4.7	-2.13	0.033	-
Rental	0.552	0.555	-0.8	-0.30	0.763	-
Large city	0.393	0.397	-0.7	-0.28	0.779	-
Eldest child is a girl	0.498	0.497	0.1	0.02	0.980	-
Parents' age	34.10	34.31	-4.2	-1.68	0.093	1.06
Parents' earned income (log)	12.424	12.377	1.8	0.61	0.542	0.99
Parents have post-secondary education	0.485	0.480	1.1	0.45	0.653	-
Foreign-born parents	0.473	0.476	-0.8	-0.30	0.764	-
Younger siblings	0.826	0.817	2.3	0.91	0.361	-
Family type A	0.140	0.150	-3.2	-1.17	0.242	-
Family type B	0.315	0.294	4.7	1.79	0.073	-
Family type C	0.190	0.191	-0.3	-0.13	0.899	-

Figure 2. Balance of matched sample

Appendix 4

Table 6. Family composition and test scores in schools selected among relocating families vs matched control families (Mahalanobis distance)

Category	Proportion of pupils whose parents:					
	Gainfully employed	Post-secondary education	Foreign background	School NP maths	School NP Swedish	Residual
Have moved (test group)	85.0%	37.4%	32.4%	90.9	90.6	-0.25
Have not moved (control group)	84.2%	35.0%	34.0%	90.4	90.1	-0.25
Difference	0.8%**	2.4%***	−1.6%**	0.4**	0.5**	0.0

Note: *C*ontrol group obtained using a Mahalanobis distance procedure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.