



School choice, housing prices, and residential sorting: Empirical evidence from inter- and intra-district choice



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ABSTRACT

This paper explores the relationship between school choice and housing price as well as residential sorting using school choice reform in the Seoul metropolitan area. With the newly implemented choice program, students are able to choose high schools outside as well as within their school districts. I estimate hedonic models using boundary fixed approach and panel fixed approach together. With sales price, rental price and advertised price of apartments as dependent variables, the findings consistently reveal that school choice reform reduces housing prices in a high-performing school district relative to the housing prices in a low-performing school district by approximately 10–27%. In addition, after reform, people in a high-performing school district are more likely to outmigrate to other communities compared to one in a low-performing school district. This implies that school choice could have unintended consequences driven by change in housing price and student composition.

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1. Introduction

School choice has been in the center of the debate about market oriented educational reforms. These reforms have focused on moving from a one-size-fits-all system toward expanding the education options that parents and students can exercise. The underlying notion for school choice is to allow parents to choose schools among a variety of options and to make the schools function like private goods in the market (Friedman, 1962; Chubb and Moe, 1990; Ladd, 2002). Accordingly, there is a growing body of research to examine the relationship between school choice and outcomes, such as student performance.

The focus of this paper is the impact of a school choice policy on residential sorting. A rich literature on local public finance provides evidence that people sort based on the level of public service under the assumption that all households residing in the same jurisdiction will receive the same level of public service (Ross and Yinger, 1999). Expanding school choice could change this assumption by weakening the link between residential location and school options. Because households decided jointly where to live and where to send their children to school, the response of families to school choice reforms may affect the quality of schools. For instance, this residential sorting can affect the property tax base of school districts and the student composition of schools, which can substantially undermine or reinforce the intended impacts of reforms.

Despite increasing interest in the benefits of school choice and a growing body of research on capitalization in local public finance, the empirical literature on links between school choice and property values is limited (e.g., Reback, 2005; Brunner et al., 2012). Rather, the analysis for the impact of school choice on property values is mainly based on simulation models (e.g., Nechyba, 1996, 2000; Epple and Romano, 1998; Ferreyra, 2007). The objective of this paper is to identify effects of school choice on housing price by using the case of a school choice reform in South Korea.

The adoption of inter- and intra-district choice programs in the Seoul Special City was announced in February 2007 and was implemented in the school year starting in February 2010. Specifically, prior to its adoption, students were assigned to their high schools mainly based on the geographic proximity within their school district. With the newly implemented choice program, students are able to choose and apply to high schools outside as well as within their school districts. The underlying premise of the program is to break the link between residential choice and the high schools that people attend and thus, provide students with more school choice options. Based on the capitalization literature, I would expect that the expanded school choice policy would result in a decrease in property values for residences located near high quality schools and an increase in property values for residences located near schools with low quality.

Empirical specification in hedonic studies (using school quality in the model) addresses the key methodological challenges, which are to separate the effects of neighborhood traits and school quality, because any unobserved heterogeneity in neighborhood traits leads to a biased estimate of capitalization resulting from its correlations with school quality. Empirical studies have relied on several identification

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strategies: neighborhood boundary fixed estimates (Black, 1999; Bayer et al., 2007; Ries and Somerville, 2010; Schwartz et al., 2014), spatial correlation (Brasington and Haurin, 2006), panel data method (Downes and Zabel, 2002; Figlio and Lucas, 2004; Clapp et al., 2008; Hilber et al., 2011) and instrument variables (Gibbons and Machin, 2003; Downes and Zabel, 2002; Hilber and Mayer, 2009).

The basic identification strategy in this paper is to use the variation of school quality within and across districts with housing data during pre- and post-reform. In addition, this paper employs several strategies together to avoid possible endogeneity problems resulting from unobserved heterogeneity in neighborhood qualities. First, because this paper takes advantage of the adoption of an expanded school choice program as a policy change, I use a panel data method by adding fixed effects for apartment complexes and time fixed effects.¹ Most of the apartments in the same complex often share common neighborhood traits, such as distance to amenities and disamenities. This allows me to control for time invariant neighborhood traits.

Second, I utilize the boundary sub-sample of housing, which is located on either side of school districts, which has been used as an identification strategy in hedonic studies with cross-sectional data. The traditional boundary fixed approach primarily relies on the attendance zone (e.g. Black, 1999). Recent studies argue that the advantage of the boundary fixed approach can be undermined because of the sorting issue (Bayer et al., 2007; Dachis et al., 2011; Dharr and Ross, 2012). Specifically, “long lasting boundaries create substantial motivation and time for owner-occupants to sort onto either side of the boundary based on their preferences” (Dharr and Ross, 2012, 19). Recent studies found the bias of the estimates in the hedonic model when mainly relying on the school attendance zone or school district boundaries in the cross-sectional data.

Focusing on the sample of housing on either side of school district boundaries has potential advantages in this paper. Prior to the adoption of school choice in Seoul, students were assigned to a high school within a school district. However, because attendance zone within a district is not rigidly formalized, geographic proximity to the high school was one of the main factors for student assignment methods. One of the main features of the new policy is to introduce inter-district choice across school districts. Thus, it is useful to emphasize the school district boundary because housing on either side of the district boundary is mainly affected by this policy. Another feature of this policy is to expand the school choice within a district, which will be discussed and tested in the next section.

The main variable identifying school quality is the admittance rate to a prestigious college (i.e., Seoul National University) because there are no school quality measures readily available to the public. In addition, I used the competition rate (i.e., the ratio of applicants to the number of fixed enrollments for each school) to capture the actual parental demand for a school. This is similar to what recent studies have used for estimating capitalization of school choice (i.e., the actual transfer rate or predicted transfer rate; see Reback, 2005; Brunner et al., 2012).

Another contribution is that I employ a variety of measures for property values such as sales price, advertised sales price (asking price) from realtors and rental price from realtors. This offers a unique opportunity to compare whether different measures of property values generate different hedonic estimates, which have rarely been tested (exception is Banzhaf and Farooque, 2013). Repeated sales data is often regarded as the most appropriate method to control time invariant housing traits, but it has been criticized because it narrows the sample (Downes and Zabel, 2002). In contrast, advertised or self-reported

price was criticized because of measurement errors resulting from the fact that real estate agencies or owners tend to report higher prices (Nguyen-Hoang and Yinger, 2011). Rental value could reflect accurate residential sorting issues because people can respond to policy changes by renting apartments in a timely way.

Finally, using school choice reform in Korea will provide a unique opportunity to examine hedonic studies in Asia because previous empirical studies in hedonic models have been extensively conducted in developed countries such as the United States, U.K. and France. This paper will extend this line of research by emphasizing school choice reform in another country. To bolster the findings, I conducted a series of falsification tests. First, I re-estimated the model using the placebo date for the announcement or implementation during the prior reform years. Second, additional analysis is conducted using the extent to which information about school choice is available. Using housing prices in two neighboring communities, the empirical results strongly support theoretical predictions about the capitalization of school choice.

The structure of this paper is as follows. The next section reviews previous literature. Sections 3 offers detailed descriptions of school choice reform in the Seoul metropolitan area. Empirical strategies and data are addressed in Sections 4 and 5. Finally, Sections 6 and 7 discuss results and discussions.

2. Literature review

Bidding analysis assumes households are mobile and benefit from public services when they reside in a certain community. School choice weakens this link between residential location and school quality and thus, can affect property values. Scholars have used two approaches to investigate the impact of school choice reform on property values. One approach is to estimate the general equilibrium effects based on the simulation model (e.g., Nechyba, 1996, 2000; Epple and Romano, 1998; Ferreyra, 2007).

Another group of studies focuses on analyzing empirically reduced form estimates of school choice reform (e.g., Reback, 2005; Machin and Salvanes, 2010; Brunner et al., 2012). Reback (2005) investigated the impact of an inter-district enrollment program in Minnesota on property values. The underlying notion is that under school choice schemes, residential property values in low-performing school districts would increase because of opportunities to transfer to other high-performing school districts. In contrast with other capitalization studies, Reback (2005) used the actual student transfer rate to capture the benefit of school choice (or school quality). This is a more ideal measure to reflect the accurate preferences of parents and students because it captures actual transfers to other schools. His findings suggest that a one point percent increase in the outgoing transfer rate is more likely to increase residential property values by 1.5% while a one point increase in the incoming transfer rate is more likely to decrease residential property values by 1.1%.

Along this line, Brunner et al. (2012) expanded the impact of inter-district public school choice programs by using a national sample. They used predicted rates of transfer to minimize endogeneity problems because the actual rates of transfer could be related with the supply and demand of enrollment systems. They found that states' adoption of inter-district choice programs in the 1990s increased population density, residential income and housing values in previously low-quality districts. More specifically, an inter-district choice policy would tend to increase residential income by 3.0% and property values by 3.4%, which is consistent with the findings of simulation models (e.g., Nechyba, 1996, 2000; Epple and Romano, 1998; Ferreyra, 2007).

Machin and Salvanes (2010) investigated the capitalization of school quality using the change in Oslo's school admission policy. Their approach was to separately estimate hedonic equations during pre-reform and post-reform years, and thereby compare the coefficients that explain the capitalization of school quality. They found that school choice weakened the link between school quality and housing price, by

¹ The sample in this paper focuses on only apartment units. In 2010, apartments are one of the major residential types, considering there are 1,435,574 units in Seoul city, which is 41% of total housing. Apartments in our sample communities consist of 65% of all residential housing. Moreover, apartments in the sub-boundary sample consist of 82.6% among all housing.

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