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Estimating the distortionary effects of ethnic quotas in Singapore using housing transactions☆

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ABSTRACT

Desegregation is a key policy issue in many countries. I investigate a residential desegregation program in Singapore — the ethnic housing quotas. I show that choice restrictions imposed on apartment blocks above the quota limits (constrained) could have distortionary effects, causing price and quantity differences for constrained versus unconstrained blocks. I test these predictions by hand-matching more than 500,000 names in the phonebook to ethnicities, to calculate ethnic proportions at the apartment block level. I can then investigate differences for constrained and unconstrained blocks close to the quota limits and test for sorting around the limits. I find that price differences are between 3% and 5%. Quantity effects are economically significant, translating to longer time-on-market durations. Selection cannot fully explain these results. My results point to challenges in achieving desegregation using quantity restrictions.

1. Introduction

Around the world, there are many policies encouraging gender and ethnic diversity in education, public and private employment, politics, and housing.[1] Countries commit large amounts of money in their budgets to encourage diversity.[2] There could be unintended distortionary costs introduced by these policies. There is a large literature on the redistributive benefits of these policies, but there is less on distortionary costs (Holzer and Neumark, 2000). I investigate potential policy-induced distortionary costs using a natural experiment in Singapore — the ethnic housing quota policy.

The quota policy was introduced in 1989 to prevent further segregation among the three major ethnic groups in Singapore — Chinese (77%), Malays (14%) and Indians (8%) (Singapore Department of Statistics, 2000). The policy is a set of limits on Chinese, Malay and Indian proportions that determine which ethnic groups are "segregated" in an area.[3] In areas above the quota limit, sellers from the non-segregated group cannot sell to buyers from the segregated group because this transaction increases the ethnic proportion of the segregated group farther above the quota limit. I quantify the distortionary effects of these policy restrictions by comparing housing transaction outcomes for constrained areas subject to the restrictions and comparable unconstrained areas. To my knowledge, this is the first paper to investigate distortionary effects of a residential desegregation policy using housing transactions.[4]

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[1] See Holzer and Neumark (2000) for a review of diversity policies in education, employment and government procurement in the United States. Around 100 countries have adopted gender quotas in politics (Krook, 2009). See Polikoff (1986) and Boustan (2011) for a review of residential desegregation policies. See Sowell (2004) for a survey of diversity-enhancing policies for other countries.

[2] In the United States, government procurement is estimated at 10% of GDP and commonly includes preferential treatment to disadvantaged groups Marion (2009). In the European Union, large sums of money are dedicated to promoting a multiculturalism model of integration, including the European Integration Fund (US$1 billion) and the European Social Fund (US$92.3 billion). In Sweden and the Netherlands, the annual integration budget ranged from US$615 million to US$738 million.

[3] For example, if the percent of Chinese in an area is above the quota limit for Chinese, then, the Chinese are "segregated", as defined by the Chinese quota limit.

[4] There is a vast empirical literature on the causes and consequences of residential segregation (See, for example, Bayer et al., 2004; Card et al., 2008; Cutler et al., 1999; Gabriel and Rosenthal, 1989) but fewer studies of the impacts of residential desegregation policies (See Banhardt, 2009; Boisjoly et al., 2006; Rosenbaum, 1995; Edin et al., 2003). Edin et al. (2004) focuses on the redistributive benefits of a refugee placement policy in Sweden for refugees.

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To do this, I develop a conceptual framework that delivers testable predictions on how prices and quantities are expected to differ for apartment blocks that are above the quota limit (constrained) versus blocks below the quota limit (unconstrained). By restricting the choices of whom non-segregated sellers and segregated buyers can transact with, the model shows that these choice restrictions on the demand- and supply-side can lead to differences in transaction outcomes for constrained blocks versus unconstrained blocks.

The model has two important features: buyers have *segregation preferences*[5] and housing markets are *thin* because housing attributes are heterogeneous along many dimensions (Arnott, 1989). Therefore, a housing unit in a given location with a vector of attributes could have few (or no) units sharing similar attributes. Because of segregation preferences, segregated buyers are willing to pay more than non-segregated buyers to live in constrained blocks. So, non-segregated sellers who cannot sell to segregated buyers have to accept a *lower* price to attract non-segregated buyers. Because housing markets are thin, segregated buyers who can only buy from segregated sellers of constrained blocks, may be willing to pay a *higher* price to live in constrained blocks if their most preferred unit is in the constrained block, their second most preferred choice is in an unconstrained block and the two choices are imperfect substitutes.

In the paper, I show that under certain assumptions, the model predicts the following price and quantity effects. First, on average, prices will be higher for Chinese-constrained blocks versus comparable unconstrained blocks, but prices will be lower for Malay- and Indian-constrained blocks. Second, fewer units will be sold in constrained blocks versus comparable unconstrained blocks. The model also highlights two mechanisms that have opposite price effects (segregation preferences versus thin markets).

I test these predictions on prices and quantities using data on two transaction outcomes, prices and the proportion of units in an apartment block that was sold during my sample period. The main identification challenge is that whether a quota binds or not is correlated with unobserved housing quality. To circumvent the problem that quota-constrained and quota-unconstrained locations are not comparable, my strategy is to identify kinks in the outcome variable that coincide with kinks in the policy rule while controlling flexibly for ethnic proportions. The identification strategy is similar in spirit to the regression kink design (Card et al., 2012).

This research design requires many observations above and below the quota limits. However, many desegregation policies impose strict upper limits so that few or no housing areas are above these limits.[6] By contrast, when the quota policy was implemented in Singapore in 1989, the Housing Development Board (HDB) did not want to evict owners in apartment blocks that were quota-constrained and they also wanted to minimize the number of households that would be affected. Therefore, they allowed all transactions that involved buyers and sellers of the same ethnicity because these transactions did not make housing areas more segregated. One benefit of analyzing housing transactions in my context is that there are many transactions both below *and above* the limits.[7]

This empirical strategy also needs data on the running variable used to determine the quota status. For the ethnic quotas in Singapore, the running variable of interest would be the ethnic proportions at the apartment block level. Since many of these policies are highly contentious, it is often hard to find public data of the running variable or even public data of the quota limits. [8] I circumvent these data issues by hand-matching more than 500,000 names to ethnicities using the Singapore Residential Phonebook. This allows me to calculate ethnic proportions for more than 8000 apartment blocks. I combined this data with outcomes for more than 35,000 housing transactions that I downloaded from the HDB website. While I do not have administrative data used by HDB to determine the quota status of each block, I show in the paper that my proxy calculated using the phonebook is a valid measure of ethnic proportions.

An important identification assumption is that individuals cannot "precisely sort" around the quota limits so that variation in the treatment status around the policy limit is "as good as randomized" (Lee and Lemieux, 2010). I test for discontinuities in the density of the running variable and do not find evidence of sorting using Chinese and Indian proportions (McCrary, 2008). For Malays, the sorting pattern is not consistent with households trying to manipulate treatment assignment. I return to this in Section 6.

I find price effects that are comparable to the literature on diversity-enhancing policies and larger quantity effects. On average, transaction prices of Chinese-constrained units are 5% higher than observably comparable unconstrained blocks. The average prices are 3% lower for Malay- and Indian-constrained blocks. Additionally, units in constrained blocks tend to be harder to sell. These effects are economically significant, translating into units being on the market 1.4 to 3.7 months longer (the median duration in this market is 42 days). I show that the results above cannot be fully explained by selection.

These estimated differences in prices and quantities between constrained and unconstrained blocks are consistent with my model. They suggest that choice distortions due to demand- and supply-side choice restrictions are significant, leading to differences in transaction outcomes. Further, I use the opposite price effects predicted in the model to disentangle the two mechanisms discussed above. I find evidence that segregation preferences are important for all three quotas. This suggests that location preferences are inelastic because of segregation preferences. I also find support for supply-side constraints and thin markets for the Chinese quotas.

Together, these estimated policy effects on prices and quantities of sold housing units imply that transaction values of constrained blocks are 12% to 21% lower than the transaction values of comparable unconstrained blocks. My calculations suggest that more than 70% of the impact on transaction values is due to reductions in the quantity domain. Understanding these effects on transaction values is important because the ease of sale affects household mobility, housing transactions have spillover effects on the broader economy and housing transaction taxes are an important source of tax revenue.[9]

These results point to distortionary effects from imposing quantity restrictions. An important lesson is that diversity-enhancing policies can exacerbate existing frictions, especially in the housing market.

[5] Buyers have segregation preferences if they are willing to pay more to live in areas with a high proportion of own-ethnic-group members.

[6] For example, the VAMBAY housing program in Andhra Pradesh in India limit public housing clusters to be 75% Hindus and 25% Muslims. This means that clusters with more than 75% Hindus are unlikely to exist. Other countries, such as Germany and Denmark, also have strict quota limits.

[7] Bertrand et al. (2010) administered a survey to study the effect of affirmative action quotas in an Indian engineering college but "the strenuous data requirements of the regression discontinuity design methods coupled with (their) limited sample size reduced (their) ability to provide conclusive evidence on the returns to attending engineering school for the marginal admit" (p. 28).

[8] For example, McCrary (2007) estimates the impact of racial hiring quotas in municipal police departments in the United States using event study analysis because "information on quotas is much more poorly measured than whether a city was litigated, and the date the litigation began" (p. 349). Chay and Fairlie (1998) report that it is hard to identify the dates of adoption of a particular affirmative action program. Bertrand et al. (2010) point out the lack of datasets that comprise both the favored group who were admitted and the non-favored group who were not admitted due to affirmative action quotas in colleges. Marion (2009) studies the impact of procurement policies favoring disadvantage business enterprises but lacks data on which firms are owned by minorities. In a separate study, Marion (2011) looks at a subsample where he has data on minority ownership, but a weaker identification strategy.

[9] See, for example, Ferreira et al. (2010), Mian et al. (2013), Mian and Sufi (2011). Housing transaction taxes account for 10% of tax revenue in Singapore in 2012 (Inland Revenue Authority of Singapore, 2013).