



Anchoring and housing choice: Results of a natural policy experiment



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ABSTRACT

This research employs data from a natural experiment to assess the effects of behavioral heuristics on housing choice and public program management. The analysis focuses on programs designed to privatize public housing in Israel. The government programs provided the tenants with a call (real) option to purchase their rental unit at a discounted exercise price. We employ a large panel of transactions over the 1999–2008 period to evaluate whether the tenants used prior program price reductions as anchors in their purchase decisions. The results of hazard model estimation provide strong evidence of anchoring in the timing of home purchase. Further, model simulation suggests that by accounting for the anchoring heuristic, program managers could have both accelerated purchases and significantly increased government revenues associated with privatization. We also find evidence that anchoring varies with individual and market characteristics.

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1. Introduction

Anomalies in household economic behavior have long been the subject of theoretical inquiry and experimental analysis. Seminal work by *Tversky and Kahneman (1974)*, for example, suggests that people tend to excessively focus on a specific piece of information and use it as an *anchor* for future decisions. The authors state that “in many situations, people make estimates by starting from an initial value that is adjusted to yield the final answer [...] adjustments are typically insufficient. That is, different starting points yield different estimates, which are biased toward the initial values. We call this phenomenon anchoring” (page 1128). Experimental findings by *Kahneman and Knetsch (1993)*, *Ariely et al. (2003)* and many others provide support for the anchoring hypothesis. Despite the preponderance of laboratory

findings, few studies have applied empirical data to demonstrate the importance of heuristics to household decisions or to public program management.¹

Over the past decade, the Israeli government sought to privatize public housing via an offer to sell rental units to tenants at a discount from the market price. The reductions were based on tenant demographic and locational characteristics and changed over time.

¹ Several definitions of the anchoring heuristic are provided in the literature [see, for example, *Chapman and Johnson (2002)*]. Our research is further relevant to a growing literature that studies whether an uninformative *number* (the anchor) influences the judgment of the decision-makers [see, among many others, *Tversky and Kahneman (1974)*, *Chapman and Johnson (1994)*, *Strack and Mussweiler (1997)*, and *Wansink et al. (1998)*]. Also, it should be noted that the experimental methodology often employed by psychologists to examine heuristics suffers from many shortfalls, including concerns as to whether (1) behavioral patterns observed under artificial laboratory conditions are replicated in real-life decision-making (see, for example, *List, 2003*; *Levitt and List, 2007, 2008*; *DellaVigna, 2009*); (2) conclusions drawn from laboratory experiments regarding individuals' consistency of preferences are reliable (see, for example, *Knetsch, 1989, 1992*); and (3) laboratory conditions are appropriate, given that subjects often are offered limited possibilities and relatively low incentives to cooperate and, generally, are not “punished” for incorrect decisions.

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The tenants had the opportunity to either accept or decline successive government sales offers. Our research employs survival analysis to empirically assess whether public housing tenants used prior price reductions as anchors (or reference prices) in the timing of home purchase.²

The analysis proceeds as follows. First, we assess the stationarity of the government price reduction time-series. Results of unit root analyses provide evidence that all series are non-stationary. Hence we could not reject the null hypothesis that the government price reduction time-series follow a random walk. Those findings together with other analyses (below) indicate that tenants could not have forecasted the successive price reduction regimes so as to strategically exercise the purchase option.

We then statistically assess the role of anchoring heuristics in timing of home purchase. We use survival analysis to estimate whether the average of the past price reduction rates anchored the tenant's reaction to the current reduction rate. In that analysis, we also stratify the sample and assess the heterogeneity of results across periods when the current reduction rate is above or below the reference (anchor) reduction rate. We subsequently employ the results of the survival analysis to simulate purchase outcomes under alternative price reduction schemes. This allows us to evaluate whether program managers could have enhanced program execution via an explicit accounting for the buyer "reference reduction effect" in determination of the price reduction algorithm. Finally, we examine the sensitivity of the estimated anchoring effects to such features as age of household head, household income, and percentage of public housing units in the structure.³

The results provide strong evidence of anchoring in home purchase decisions. Estimated tenant responses to the anchor are significantly different from zero. Further, the hazard rate associated with purchase option exercise (i.e., the probability of purchasing the unit), decreases 8% for every 1% increase in the anchor in excess of the current reduction rate. In contrast, when the anchor is less than the current reduction rate, a 1% increase in the anchor leads to a significant 1% increase in the hazard rate. As shown in the model simulation, by accounting for the anchoring effect, policymakers could have both significantly accelerated the sale of public housing units and substantially reduced privatization costs. Finally, as anticipated, the results indicate that the estimated anchoring effect varies with characteristics of home purchasers.

The contribution of the research is twofold. First, our evidence on the role of the anchoring heuristic derives not from the laboratory but rather from a unique, real-world natural policy experiment. In that regard, our sampled households face decisions that involve substantial financial resources and have important long-term household economic consequences. Second, our analysis demonstrates a simple, practical, and direct application of cognitive biases to public policy. It shows how policymakers could use the estimated anchoring effect to more efficiently attain programmatic objectives. To the best of our knowledge, this paper is the first to examine the role of heuristics in a public program context.⁴

² Following Tversky and Kahneman (1974), we use the terms "anchoring" and "anchor" throughout the paper [see also Ariely et al. (2003)]. An alternative and equivalent terminology is "reference price" in the cases where the anchor refers to the monetary price of a product [e.g., Simonson and Tversky (1992), Ariely and Simonson (2003), Bajari and Hortacsu (2003), Kamins et al. (2004), Stern and Stafford (2006), Hoppe and Sadrieh (2007), and Rosenkranz and Schmitz (2007)].

³ Here the analysis is motivated, in part, by studies by Genesove and Mayer (2001) and List (2003, 2004), who examine the effect of experience on heuristics. List (2003, 2004) demonstrates, as anticipated from rational expectations theory, that unlike inexperienced actors, experienced card collectors exhibit no status-quo bias.

⁴ Also, unlike most tenure choice studies, public housing tenants may either purchase or continue to rent the identical housing unit – hence, the tenure choice pertains to the same property. In contrast, studies dealing with movers from one location to another [e.g., Simonsohn and Loewenstein (2006)], largely do not control for variations in the structural features of the dwellings in question.

The plan of the paper is as follows. The following section provides background and literature review. Section 3 provides a brief description of the sale programs, while Section 4 describes the data, including variable definitions and related summary statistics. Section 5 presents the empirical model whereas Section 6 provides related estimation results in support of anchoring effects. Section 7 describes simulation of alternative reduction rate schemes and demonstrates practical implications of the anchoring heuristic in the assessment of management of public program design. Section 8 assesses the robustness of results to model specification while Section 9 evaluates the sensitivity of anchoring findings to individual interactive terms. Finally, Section 10 provides summary and concluding remarks.

2. Background

The majority of evidence in support of the anchoring heuristic derives from experimental settings. That literature covers a range of applications, notably including papers by Plous (1989), Wright and Anderson (1989), and Yamagishi (1994) in the estimation of risk and uncertainty; Johnson and Schkade (1989), Carlson (1990), and Chapman and Johnson (1994) in the evaluation of monetary lotteries; Cervone and Peake (1986) in assessment of self-efficacy; Davis et al. (1986) in judgments of spousal preferences; Chapman and Bornstein (1996) and English and Mussweiler (2001) in jurors' decision-making; Dodonova and Khoroshilov (2004) in online auctions; Joyce and Biddle (1981) and Butler (1986) in financial auditing; and Ariely et al. (2003) in coping behavior associated with disturbing noises.⁵ All of these laboratory-based experiments compare behaviors among groups of subjects exposed to different single anchors. With the exception of Ariely et al. (2003), none of these studies focus on a series of successive anchors.

In contrast to experimental literature, empirical analyses (including field experiments) of behavioral anomalies are less prevalent. Accordingly, the literature contains only a few empirical studies focusing exclusively on anchoring. Relevant examples include studies of endowment effects among card collectors [List (2003, 2004)]; sales programs for sanitation and health products in Zambia and Kenya [Ashraf et al. (2010) and Dupas (2010)]; and the impact of the seller's reservation price on the final price in online internet bid auctions [see Ariely and Simonson (2003), Bajari and Hortacsu (2003), Kamins et al. (2004), Stern and Stafford (2006), Hoppe and Sadrieh (2007) and Trautmann and Traxler (2010)].

In the housing literature, a few empirical studies have examined behavioral anomalies. As would be expected, anchoring appears to be important to real estate appraisal and to seller asking price (e.g., Northcraft and Neale (1987)). Genesove and Mayer (2001) and Anenberg (2011) show that loss aversion affects condominium asking prices, in that the purchase price serves to subsequently anchor the unit price at re-sale. Simonsohn and Loewenstein (2006) demonstrate the importance of anchoring to rental housing consumption among movers. They suggest that rental rates in the prior location serve as anchors for movers to new locations.

In the wake of the recent severe boom–bust cycle in housing, the efficacy of government interventions and related housing assistance programs is of broad concern. While DiPasquale et al. (2003) and Olsen (2003) review and assess housing assistance programs in the U.S., we are unaware of any study other than our own that indicates the importance of heuristics to policy implementation and housing program design. Further, in many countries, notably including the U.K., China, Russia, and numerous Eastern European nations, major programs have been launched to privatize the substantial stock of public housing. Below we apply the real option approach to assess the role of the

⁵ For a thorough review of the literature on anchoring and other behavioral anomalies see, for example, Chapman and Johnson (2002) and DellaVigna (2009).

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