Efficiency in housing markets: Which home buyers know how to discount?

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ABSTRACT

We test for efficiency in the Swedish co-op market by examining the negative relationship between the sales price and the present value of future monthly payments or 'rents'. If the co-op housing market is efficient, the present value of co-op rental payments due to underlying debt obligations of the cooperative should be fully reflected in the sales price. However, a one hundred kronor increase in the present value of future rents only leads to an approximately 75 kronor reduction in the sales price. These inefficiencies are larger at the lower end of the housing market and in poorer, less educated regions and appear to reflect both liquidity constraints and the existence of more 'sophisticated' buyers in higher educated areas. Overall, our findings suggest that there is some systematic failure to properly discount the future stream of rent payments relative to the up front sales price.

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1. Introduction

For the majority of households, the purchase of a home is the largest financial decision of their lives. One may therefore assume that housing market transactions are conducted by agents who have carefully evaluated all available information and that the resulting prices reflect that information. A growing number of studies, many of which are based on time-series of home sales and rental data, therefore test whether housing prices are in fact informationally efficient.[1] This paper takes advantage of the nature of the cooperative housing market in Sweden to provide an alternative test of market efficiency.

Cooperatives are distinct from condominiums in that the purchaser of a unit in a cooperative housing association is formally buying a share in the cooperative, along with the non-time-restricted right to occupy the unit, i.e. the actual apartment. Owners of a co-op unit must make a monthly payment comprised of maintenance fees and the capital costs attributed to the cooperative's debt. For the remainder of the paper, we will refer to the total of these monthly payments as 'rents'. The capital costs component derives from the fact that the formal owner of a co-op unit is the cooperative association; the cooperative can have its own debts, which are serviced through the collection of rents from the members of the cooperative, i.e. the indirect owners of the cooperative apartments. These implicit interest payments in the monthly co-op rents are on top of any direct mortgage service obligations that the home buyer may have incurred. Thus, only part of the true cost of owning a co-op unit is reflected in the actual sales price; the remaining cost is reflected in the monthly rent. The total value of a co-op unit can therefore be expressed as the sum of its sales price and the discounted value of the cooperative financing component of the future monthly rent payments, i.e. rent excluding the maintenance fee component.

This simple present value relationship provides the starting point for our analysis. In particular, if markets are efficient, there should be an inverse one-to-one relationship between prices and discounted rents. That is, if the present value of rents goes up by one unit, prices should decrease by one unit.

Although this analysis relies on Swedish data, there is no reason to believe that the findings cannot be extended to housing markets in other countries or, indeed, to non-cooperative forms of housing. Co-ops are also quite common in many other countries, including Finland and Canada, and in certain cities in the US, such as New York, where they tend to dominate the market for owner occupied apartments.[2] More generally, our test of market efficiency is a test of

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[1] Most related to the current paper are Meese and Wallace (1994) and Gallin (2005). Other studies that consider aspects of housing market efficiency include (Case and Shiller, 1989, 1990; Case and Quigley, 1991; Guntermann and Norrbin, 1991; Gatzlaff, 1994; Berg and Lyhagen, 1998; Englund et al., 1999; Hill et al., 1999; Malpezzi, 1999; Rosenthal, 1999; Hwang and Quigley, 2002, 2004; Hwang et al., 2006).

[2] Co-ops have also been increasing in popularity in the 1990s and 2000s in a number of U.S. cities, including Chicago, Washington, D.C, and Miami. For an extensive analysis of co-ops in New York, see Schill et al. (2004).

proper discounting, or comparison, of future payments relative to upfront costs. This is strongly related to traditional tests of housing market efficiency, which compare house price indices to present values of rent-cost indices (e.g., Meese and Wallace, 1994). The major drawback of this traditional approach is that rent and price indices are, for obvious reasons, not based on the same housing units or, more importantly, units that necessarily have comparable characteristics; Glaeser and Gyourko (2007) provide evidence that this is in fact the case and argue against the robustness of empirical analyses based on rent-price comparisons. In addition, these types of analyses rely on the time-series properties of the housing market data, which may be partly determined by frictions in the market; Meese and Wallace (1994) try to get around this second issue by considering tests of efficiency in the long-run, where short-run market frictions should play no role.

In contrast, by utilizing the fact that a co-op has both a price and a rent component, we can test a present value relationship by comparing across co-op units, rather than between rental and owner occupied units. This offers several advantages. The buy versus rent decision is a very large one for most households, and may depend on many factors, not all of which are of a financial nature. By focusing on actual co-op purchases, we eliminate this part of the decision making process and therefore expect a cleaner present value relationship. Cross-sectional transaction data also alleviates concerns about the time-series properties of the data. Finally, in our setup, there is a clear theoretical cross-sectional relationship between rents and prices; deviations from this relationship are easily translated into actual measures of miss-pricing.[3]

Our analysis is based on a data set of more than 30,000 Swedish co-op transactions between 2002 and 2005 and hedonic price regressions that relate co-op sales prices to the present value of future rents.[4] Our preferred specification controls for a variety of apartment characteristics, unobservable neighborhood characteristics through zip code fixed effects, and national and regional time trends. We find that an increase in discounted rents of 100 Swedish kronor (SEK) only leads to a decrease in price of about 75 SEK (8 SEK ≈ 1 US$). On average, co-ops with high rents are thus relatively over-priced. This result cannot be explained away by potential changes in future rents or interest rates. For instance, buyers need to have extremely risk-averse beliefs regarding the paths of future interest rates to reconcile our estimates with market efficiency.

An alternative hypothesis that may explain these findings is that not all buyers have a common discount rate, as our baseline specification assumes. Rather, some may have substantially higher discount rates due to liquidity constraints; that is, home buyers who cannot make the necessary down payment will face a higher marginal mortgage rate. To explore this scenario, we redo our analysis for sub-samples of the data grouped on apartment size. One may expect apartment size to be a reasonable proxy for liquidity, as poorer and first time buyers, i.e. those most likely to be constrained, are those most likely to buy the smallest apartments. Even for the largest apartments, however, we find evidence of inefficiency; it is thus hard to argue that liquidity constraints can be the sole explanation for our findings. In addition, even if we allow a 2% top loan markup, which should be at the high end of the spectrum, there is still strong evidence of inefficiency at the lower end of the market (i.e. small apartments). Thus, liquidity constraints

potentially play a role in the price formation in certain parts of the market, but cannot explain the overall inefficiency observed.

Similarly, we estimate our basic model separately for each parish or county in our data. We find evidence of inefficiency in 57 of 70 parishes, including those at both ends of the socioeconomic spectrum. However, these inefficiencies tend to be greater in poorer and less educated parishes. While these findings are likely to partly reflect the liquidity constraints described above, they are also consistent with there being more informed and 'sophisticated' buyers in higher educated areas who push prices closer to efficiency. Further analyses that group the data jointly on apartment size and education level provide evidence that both liquidity constraints and 'sophistication' are relevant to explain our findings.

Overall, our findings suggest that there is some systematic failure to properly discount the future stream of rent payments relative to the upfront sales price. This is in line with the time-series results reported in the literature, which typically show that house prices tend not to be efficient (e.g Case and Shiller, 1989, 1990; Røed Larsen and Weum, 2008). The heterogeneity across different groups of buyers is also consistent with recent findings in the emerging household finance literature. In a series of papers, Campbell (2006) and Calvet et al. (2007, 2008) document that higher-educated and wealthier households are more likely to satisfy the predictions of standard financial models.

The rest of the paper proceeds as follows. Section 2 provides background information about the Swedish co-op housing market. Section 3 outlines the theoretical relationship between prices and rents and discusses the calculation of the present value of future rent payments. In addition, it presents the econometric model and discusses the potential identification issue of omitted variables. Section 4 describes the data and Section 5 presents the main empirical results, including an analysis of how sensitive the findings are to assumptions about future rents and interest rates. Section 6 explores whether the findings of inefficiency are heterogeneous across parishes and socioeconomic characteristics and discusses alternative explanations of these findings, including the potential role of risk premia. Section 7 concludes.

2. The Swedish cooperative market

2.1. Overview and market characteristics

Table 1 provides national housing market statistics for Sweden and a selection of other countries. During our sample period (from Q1 of 2002 to Q3 of 2005), the prices of homes and the cost of renting in Sweden increased by 36 and 10%, respectively.[5] In 2003, 64% of Swedish homes were owner-occupied and 56% were single unit dwellings. In terms of these characteristics, Sweden is quite comparable to a number of other countries over the sample period, including Denmark, the US and, the UK. The change in the Swedish housing price index shown in Table 1 is also very similar to the average price change observed for our sample of co-op transactions (see Fig. 1 in Section 4).

Cooperative (co-op) ownership is the only way to own an apartment in Sweden; condominiums do not exist as an alternative. Apart from single-family houses, co-ops are therefore the only other form of owner-occupied housing, and in central areas of most cities, the only alternative to rental apartments. According to Statistics Sweden, 16% of the population lived in co-ops and about 36% in rental units, as of 2001. The Swedish housing market, and especially the co-op market, is generally characterized by few market frictions and low transaction costs, including minimal mortgage fees.

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[3] Røed Larsen and Weum (2008) also use price data on cooperative housing in Oslo to test for efficiency in the Norwegian housing market. In contrast to the current study, however, they focus on the time-series properties of the data and do not analyze the cross-sectional present value relationship between rents and prices, which is the focus here.

[4] Linneman (1986) also relies on hedonic price regressions to determine what the 'fair' value of houses are and classifies the market as inefficient if the pricing errors based on the fitted hedonic regression exceed the transaction costs in the market for a substantial number of observations.

[5] Note that the rent-cost indices in Table 1 refer to rents on actual rental units and not the 'rent' on co-ops that we refer to everywhere else in the paper.