

# The Impact of Lock-In Effects on Housing Turnover and Implications for a Housing Recovery



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# Introduction

In November of 2012, the average U.S. interest rate on 30-year fixed-rate mortgages fell to 3.35 percent, its lowest point in more than four decades. From the end of 2008, when long-term interest rates began their precipitous and policy-induced drop, through the end of 2012, homeowners took advantage of these low rates in large numbers by obtaining lower-cost fixed-rate mortgages.<sup>1</sup> During these four years alone, more than 20 million U.S. homeowners refinanced their existing loans.<sup>2</sup>

A rise in long-term interest rates has the potential to lock these homeowners into their existing residences because they will be reluctant to switch to a higher mortgage rate on a new loan. The pullback of the Federal Reserve's Quantitative Easing policy is certain to generate such a rise. Further, homeowners who are locked in due to the increase in interest rates would join existing households locked in due to negative equity caused by the one-third decline in house prices between 2006 and 2010.<sup>3</sup> The growing number of locked-in households will in turn cause a deep reduction in housing turnover, or sales activity, and this reduction will be particularly steep in the strongest housing markets.

This research brief summarizes some of the key findings from a working paper by Patric Hendershott, Jin Man Lee, and James Shilling of the Institute for Housing Studies (IHS) at DePaul University (2013). The brief describes how the recent housing and economic crisis and subsequent policy response has created the conditions for lock-in effects and shows how these effects impact rates of residential mobility and housing turnover in Cook County, Illinois, home of the city of Chicago. It also details the results of a simulation model that estimates how the number of locked-in households in different types of submarkets might grow under a scenario of increased house prices and steadily rising interest rates.

<sup>1</sup> Interest-rate data are reported by Freddie Mac: [www.freddiemac.com/pmms/pmms30.htm](http://www.freddiemac.com/pmms/pmms30.htm). While monthly rates on 30-year fixed rate mortgages fluctuated slightly by month after 2009, they remained continuously below 6% after November of 2008. In no other year since 1971 was this true.

<sup>2</sup> IHS calculations of Home Mortgage Disclosure Act data. Total number of refinance loans originated on 1-4 family and manufactured home dwellings, Home Mortgage Disclosure Act, 2009 (5,758,875); 2010 (4,961,814); 2011 (4,311,870); 2012 (6,637,361).

<sup>3</sup> IHS calculations of data from S&P Case-Shiller Seasonally Adjusted U.S. National Home Price Index Levels, accessed January 10, 2014.

## Background – Lock-In Effects

Equity lock-in occurs when a household is in or near a negative equity position. That is, the value of the home is less than what is owed on the property’s mortgage. Homes with negative equity are often referred to as being “underwater.” In order to sell a house with negative equity, a homeowner either has to make up the difference between the mortgage principal and the sale price of the home or negotiate with their lender to accept a short sale.<sup>4</sup> Moreover, in order to buy a different house, the owner would have to come up with additional funds for a down payment. As a result, many underwater or near underwater homeowners may choose to wait for prices to appreciate or for their mortgage principal to be paid down further before selling.

The dramatic rise and then fall of house prices since 2000 created widespread negative equity. Between 2000 and 2006, U.S. house prices increased by 90 percent.<sup>5</sup> This rapid rise was driven by loose underwriting standards that made mortgage credit easily and widely available to many households that would not have previously qualified for mortgages. As a result, a record number of households became homeowners and many others refinanced their existing mortgages to extract the equity that had built up in an appreciating market.

With the collapse of the subprime market in 2007 and the widespread economic crisis that followed, house prices declined by a third.<sup>6</sup> This left millions of households that purchased or refinanced their home during the boom underwater. Data from CoreLogic indicate that at the depth of the housing crisis in the first quarter of 2010, 12.1 million or 25.9 percent of all residential properties had negative equity.<sup>7</sup> Even with subsequent price gains, 7.1 million or 14.5 percent of all residential properties were still in negative equity in the second quarter of 2013.<sup>8</sup>

Interest-rate lock-in occurs when a household has a nonassumable, or non-transferable, mortgage with a low interest rate and available interest rates then rise. For homeowners with interest-rate lock-in, buying even an identically priced house at the same mortgage amount would require paying a higher interest rate and therefore a higher monthly mortgage payment, leaving them less likely to purchase any new home.

Severe interest-rate lock-in occurred in the late 1970s and early 1980s. Between November 1978 and November 1981, the average monthly rate for a 30-year fixed-rate mortgage rose from 10.1 to 17.8 percent.<sup>9</sup> Research based on this period indicated that high levels of interest-rate lock-in lowered household mobility by 15 percent for every 2 percent increase in rates.<sup>10</sup>

A steady rate of turnover, or sales, of homes is essential to a healthy housing market and local economy because it spurs consumer spending, makes less-expensive “starter” homes available to new homebuyers as existing homeowners “trade up,” and enables the local labor market to function most efficiently by allowing

<sup>4</sup> In a short sale, the lien or mortgage holder must agree to forgive the difference between the sale price and the amount owed on an underwater home.

<sup>5</sup> IHS calculations of data from S&P Case-Shiller Seasonally Adjusted U.S. National Home Price Index Levels, accessed January 10, 2014

<sup>6</sup> IHS calculations of data from S&P Case-Shiller Seasonally Adjusted U.S. National Home Price Index Levels, accessed January 10, 2014

<sup>7</sup> Core Logic Equity Report First Quarter of 2010 through Fourth Quarter of 2012 at [www.corelogic.com/research/negative-equity/corelogic-q4-2012-negative-equity-report.pdf](http://www.corelogic.com/research/negative-equity/corelogic-q4-2012-negative-equity-report.pdf)

<sup>8</sup> Core Logic Equity Report Second Quarter 2013 at [www.corelogic.com/research/negative-equity/corelogic-q2-2013-equity-report.pdf](http://www.corelogic.com/research/negative-equity/corelogic-q2-2013-equity-report.pdf)

<sup>9</sup> Interest-rate data are reported by Freddie Mac: [www.freddiemac.com/pmms/pmms30.htm](http://www.freddiemac.com/pmms/pmms30.htm)

<sup>10</sup> See Quigley, John M. (1987) “Interest Rate Variations, Mortgage Prepayments and Household Mobility,” *Review of Economics and Statistics*, 69, 636-643

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households to be mobile. The previously mentioned research found that in the early 1980s, even a small change in average residential mobility due to interest-rate lock-in resulted in “a large decrease in inter-urban and intra-regional mobility of labor,” and thus a decrease in the efficiency of the labor market.<sup>11</sup>

In response to the recent collapse of the housing market and economic recession, the Federal Reserve lowered short-term interest rates to zero in late 2008 in an attempt to encourage lending and increase consumer spending. This action failed to substantially lower 30-year mortgage rates. To generate a further decrease in longer-term rates and provide a needed spark to the housing market, the Federal Reserve initiated a program called Quantitative Easing in which it purchased mortgage-backed securities from government-sponsored enterprises (GSEs) like Fannie Mae and Freddie Mac to add to the reserves of financial institutions.<sup>12</sup>

Largely as a result of Quantitative Easing, long-term interest rates began to drop steadily in 2009 and by the first half of 2013, the mortgage rate averaged just over 3.5 percent. Homeowners responded to these lowered rates by refinancing in large numbers. From 2009 to 2012, almost 22 million homeowners refinanced existing mortgages. Tighter bank underwriting meant that higher income and more credit worthy households were best able to refinance, however. Nearly half of those who refinanced during this period made 120 percent or more of their area’s median income and just under 44 percent lived in higher-income neighborhoods.<sup>13</sup>

**This surge in refinancing has set the stage for interest-rate lock-ins going forward.** In December of 2013, the Federal Reserve initiated a moderate pull back of large asset purchases, and long-term interest rates rose in response.<sup>14</sup> Continued economic recovery and pullback by the Federal Reserve will generate further rising interest rates and may lock in more households that purchased or refinanced at historically low rates.

<sup>11</sup> Ibid.

<sup>12</sup> For more information on the relationship between Quantitative Easing and long-term interest rates see “Quantitative Easing: Lessons We’ve Learned” by Brett W. Fawley and Luciana Juvenal in *The Regional Economist*, July 2012 at [www.stlouisfed.org/publications/re/articles/?id=2258](http://www.stlouisfed.org/publications/re/articles/?id=2258)

<sup>13</sup> IHS calculations of Home Mortgage Disclosure Act data.

<sup>14</sup> Appelbaum, Binyamin. December 18, 2013. “Fed to start Unwinding its Stimulus Next Month” *New York Times* at [www.nytimes.com/2013/12/19/business/economy/fed-scales-back-stimulus-campaign.html?ref=quantitativeeasing&r=1&](http://www.nytimes.com/2013/12/19/business/economy/fed-scales-back-stimulus-campaign.html?ref=quantitativeeasing&r=1&)

## Measuring the Impact of Lock-In Effects on Local Housing Markets

In the recent working paper, “**The 2005-2011 Housing Boom and Bust: Impacts on Housing Turnover and Implications for Recovery**,” IHS researchers Patric Hendershott, Jin Man Lee, and James Shilling developed a set of statistical models to measure the magnitude of equity and interest-rate lock-in effects in the Cook County, Illinois, housing market and simulate the impact of these effects on future housing turnover in different Cook County submarkets given an increase in house prices and rising interest rates.

The researchers built a dataset using parcel-level mortgage recording data from **IHS’s Data Clearinghouse** and estimated outstanding single family mortgages, the interest rates on these mortgages, and their outstanding mortgage principal amounts in each year from 2005 to 2011.<sup>15</sup> The researchers then estimated submarket-level price indices to track changes in single family house prices over time and used these to estimate the loan-to-value ratio (LTV), or equity position, of each outstanding mortgage. From this data set, they were able to estimate for each year the number of households that were locked-in by equity, interest-rate, or not experiencing lock-in conditions.<sup>16</sup>

Using these data, the IHS researchers then estimated a statistical model of housing turnover from 2005-2011.<sup>17</sup> The model contained the submarket-level economic and demographic factors that commonly affect a household’s mobility, including household income, age, and education, as well as the numbers of equity and interest-rate locked-in households. **Controlling for these factors, the researchers found that increasing the number of equity locked-in households by 10 percent reduced the turnover rate by 13 percent. A 10 percent increase in the number of interest-rate locked-in households caused an even more dramatic 29 percent decline in turnover.**

<sup>15</sup> For more details on the data and statistical methodology used, please see the **working paper**.

<sup>16</sup> For the purposes of this brief, a household is a property with a mortgage in a given year. A household that is equity locked-in is a property with a mortgage where the loan-to-value (LTV) ratio is greater than 90 percent including properties with mortgages with negative equity. An interest-rate locked-in household is a property with a mortgage that has an LTV less than 90 percent, but has a fixed rate, non-assumable loan with an estimated coupon rate less than the market rate in that year.

<sup>17</sup> Turnover is considered here as the number of residential property sales per 100 residential properties.

## Simulating the Potential Impact of Rising House Prices and Interest Rates on Lock-in Effects and Housing Market Turnover

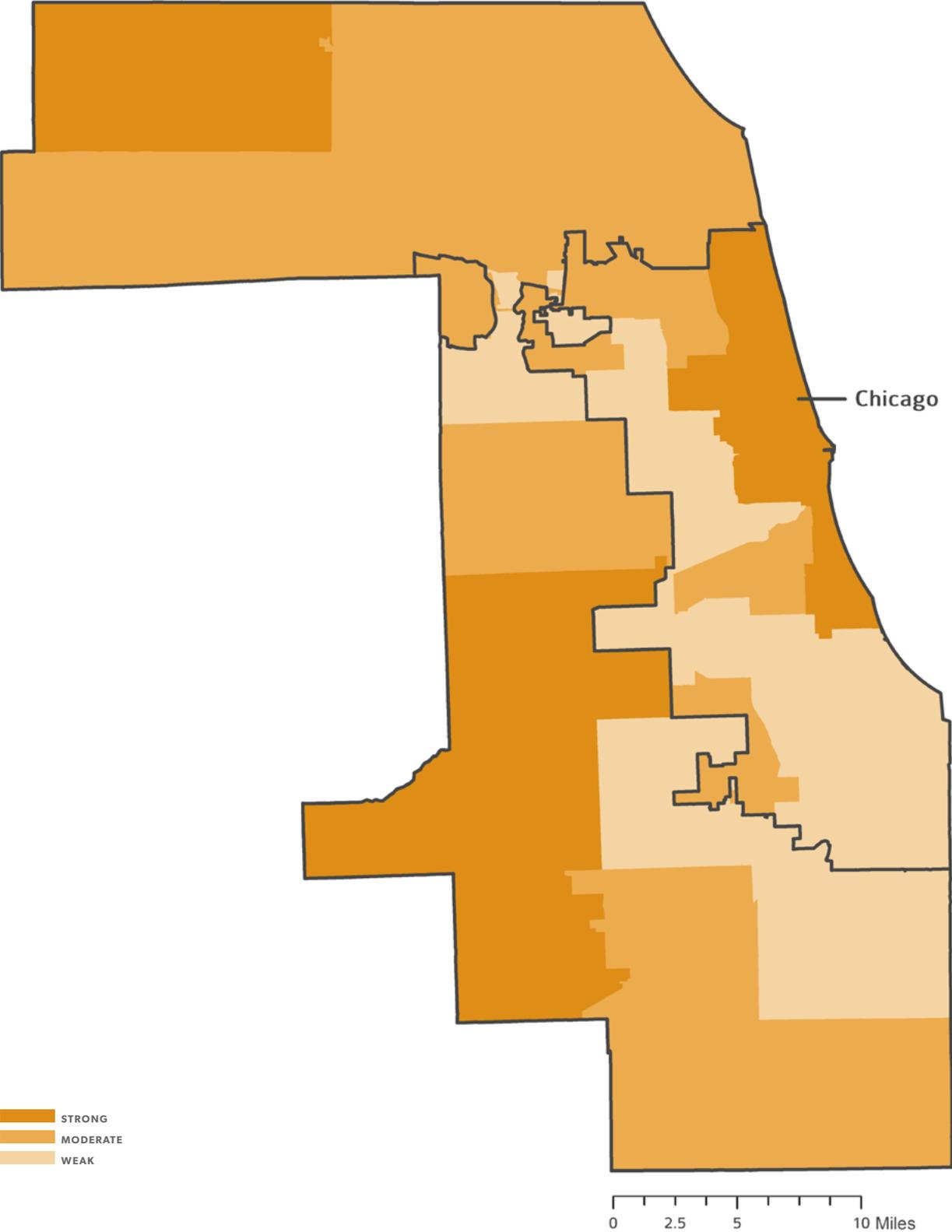
IHS researchers then simulated the effect that rising house prices and interest rates would have on the number of locked-in households and thus the housing turnover rate in different types of submarkets. Market conditions in 2011 were set as the baseline. From there, the researchers posited a 10 percent increase in house prices in year one and then projected how lock-in effects would change based on a series of annual one percentage point increases in mortgage rates.<sup>18</sup>

In order to examine the effect of rising interest rates in areas with different housing market conditions, the authors divided Cook County into a set of submarkets that shared similar recent house price trends. This brief simplifies the authors' findings by partitioning Cook County into three housing submarkets: strong, moderate, and weak. At the extremes, strong submarkets are characterized by more stable house prices. Peak to bottom price declines in strong submarkets ranged from 11 to 29 percent. Weak submarkets, on the other hand, had more dramatic price declines ranging from 45 to 65 percent from peak to bottom price levels. Figure 1 maps the three housing markets in Cook County.

<sup>18</sup> In each of the three years following this one time price increase, mortgage rates increase by one percentage point, rising from 3.7 percent to 6.7 percent.

**FIGURE 1**

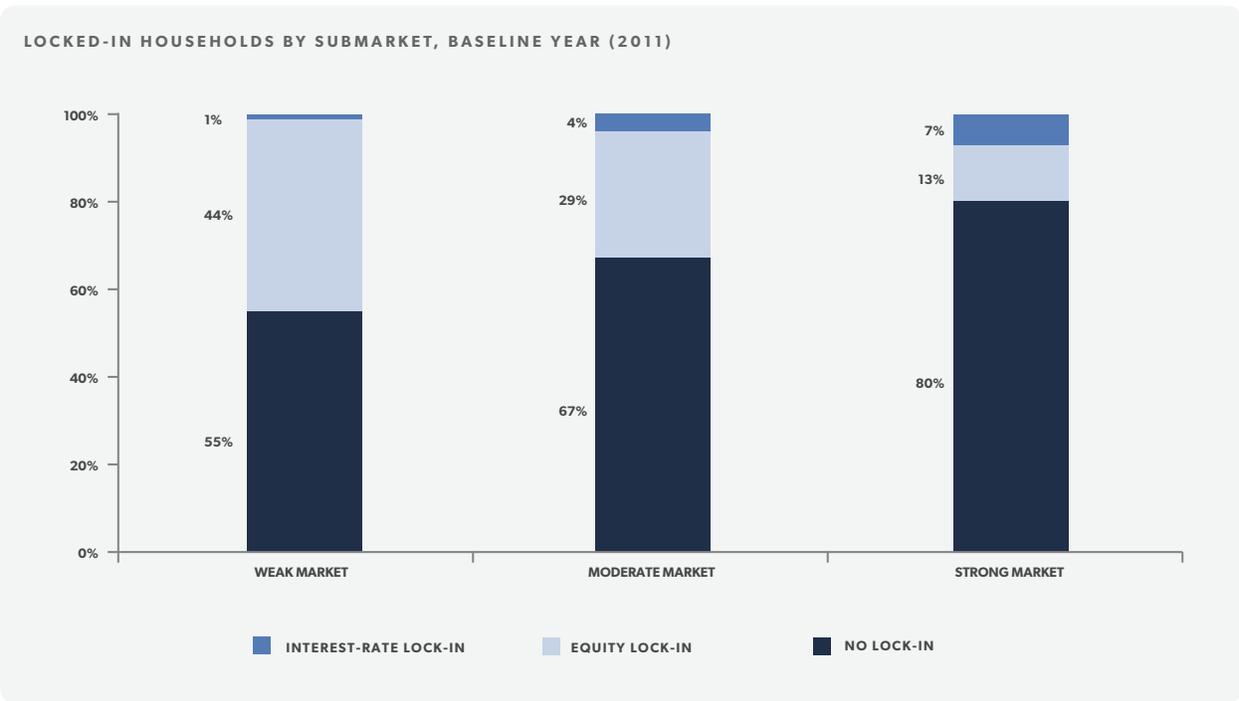
COOK COUNTY HOUSING SUBMARKET AREAS



As a result of the variation in house price trends in Cook County submarkets, the lock-in conditions present in the baseline year differ considerably. Chart 1 shows the percent of properties with equity or interest-rate lock-in in each market in 2011, the baseline year for the simulation. It illustrates that equity lock-in is most substantial in weak submarkets that experienced the largest price declines and fairly small in strong submarkets where price declines were smallest. While 44 percent of households were locked-in by equity in weak submarkets, only 13 percent of households in strong submarkets were considered to be locked-in by equity in the baseline year.

While stronger submarkets had the lowest level of equity locked-in households, these submarkets had the highest level of interest-rate locked-in households. As discussed previously, starting in 2009, the bulk of refinance lending took place in the strongest, highest-income housing submarkets. These submarkets have the highest share of interest-rate locked-in households in the baseline year. Chart 1 shows that 7 percent of households in strong submarkets were estimated to be interest-rate locked-in, while only 1 and 4 percent of households were interest-rate locked-in in weak and moderate submarkets, respectively. Importantly, in the baseline year, 80 percent of households in strong submarkets had no lock-in compared to 55 percent of households in the weaker markets.

**CHART 1**



The results of the simulation show that households “unlocked” by modest price increases would not be sufficient to offset an increasing number of households locked in by steadily rising interest rates. Table 1 compares lock-in effects in the baseline year with lock-in effects in the final year of the simulation. It shows that more households are locked-in in the final year of the simulation than were locked-in during the baseline year and that this increase is driven by an increase in interest-rate locked-in households in all submarkets. Strong submarkets have the largest increase in interest-rate locked-in households owing to the greater number of households with below-market rate mortgages. The share of interest-rate locked-in households in strong submarkets rose by 35 percentage points, from 7 percent in the baseline years of the simulation to 42 percent in the final year. By comparison, the increase was 29 percentage points in moderate submarkets and only 16 percentage points in weak submarkets.

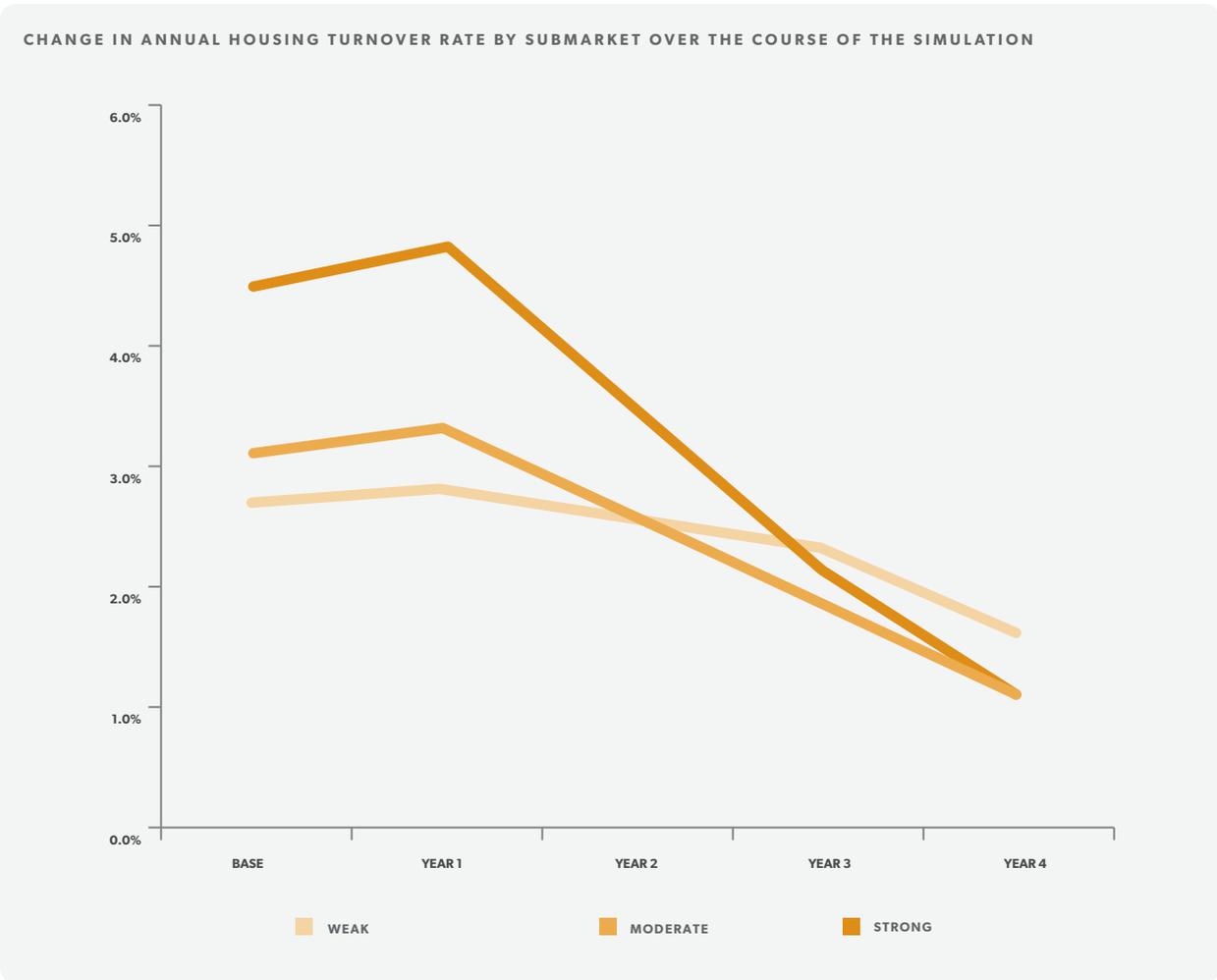
**TABLE 1**

LOCKED-IN HOUSEHOLDS IN THE VARIOUS SUBMARKETS, BASELINE AND YEAR 4 OF SIMULATION

	Weak Market			Moderate Market			Strong Market		
	Baseline	Year 4	Change	Baseline	Year 4	Change	Baseline	Year 4	Change
Interest-rate Lock-In	1%	17%	16%	4%	33%	29%	7%	42%	35%
Equity Lock-In	44%	41%	-3%	29%	24%	-5%	13%	7%	-6%
No Lock-In	55%	42%	-17%	67%	43%	-28%	80%	51%	-32%

The growing number of locked-in households over the course of the simulation affects housing turnover. Chart 2 illustrates how the simulated changes in lock-in affects annual housing turnover rates. At the beginning of the simulation, the turnover rate in strong submarkets is highest with roughly 4.5 percent of all properties selling in that year. The turnover rates in the other markets are only about 3 percent. The one time price increase in year one of the simulation caused turnover rates to increase slightly in all submarkets. However, as a result of rising interest rates and the steady increase in interest-rate locked-in households in all submarkets starting in Year 2, the simulation projects a substantial decline in housing turnover in the following years. The strong and moderate submarkets experienced the biggest declines because they had the largest increase in interest-rate locked-in households over the course of the simulation. In fact, the simulation model projects housing turnover rates in strong and moderate submarkets to fall below levels seen in weak submarkets by Year 4.

**CHART 2**



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# Conclusion

The working paper highlighted in this Research Brief illustrates the relationship between equity and interest-rate lock-in and housing turnover. Because an economic recovery is expected to affect these lock-ins, analysis of their impact is important. In particular, rising house prices will reduce equity lock-in, but rising interest rates will increase interest-rate lock-in.

The scenario described here is a 10 percent increase in house prices followed by three annual one percentage point increases in mortgage rates and is meant to simulate the unwinding of the Federal Reserve's Quantitative Easing in particular. In this scenario, the number of households "unlocked" by the modest price increase are far less than the number of households locked-in by the rising interest rates. The result would be a dramatic slowdown in housing turnover. The slowdown would be most pronounced in the strongest housing markets where households were more able to take advantage of historically low interest rates to refinance their mortgages.

In Cook County, as is occurring nationally, the strongest housing markets have been leading the housing market recovery. The findings raise concerns that significant increases in long-term interest rates could reduce housing turnover rates in these areas, slowing an overall housing market recovery and threatening broader economic gains.

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