While 84,559 homebuyers in Illinois put in a claim for the Federal Home Buyer Tax Credit, only 25,504 sales were actually boosted by the incentive

Chenxi Yu and Laura Atuesta

According to the September 2nd report by the Government Accountability Office (GAO), 84,559 home sales in the State of Illinois took advantage of the Recovery Act and Assistance Act. The number of claims for the tax refund amount to over 50% of the total home sales. While there is no doubt that the credit did a lot to accelerate sales, it is not clear just how many of those sales might have happened anyway – consumers who were in the market took advantage of the credit.

Chenxi Yu and Laura Atuesta from the Regional Economics Application Laboratory (REAL) at the University of Illinois have estimated that the real boost from the Home Buyer Tax Credit (HBTC) in Illinois was around 1,594 sales per month, of approximately 25,504 sales during the 16-month time span of the incentive. The total number of sales during the same time period was 154,657. Thus, about 16.5% of the sales may be attributed to the effect of the tax incentive.

“Our estimates suggest that only about 16.5% of the sales in Illinois could be attributed to the Home Buyer Tax Credit rather than the 50% claimed by the GAO study,” remarked Chenxi Yu from REAL, “while the remaining sales for which the credit was claimed would probably have occurred anyway. In all probability, the HBTC along with historically low interest rates probably accelerated the timing of housing purchases.”

The results were obtained from an application of “intervention analysis” that enables the calculation of the incremental impact of an event – in this case, the housing tax credit. Illinois had 14,072 houses sold per month on average before the economic downturn. This number dropped to 8,076 sales per month after the onset of the economic crises, but before the implementation of the HBTC. Then, the average monthly sales number rose to 9,671 with the help of the incentive program. Thus, we can consider that the difference between these two figures: 1,595 sales (25,504 sales in 16-month), was the pure contribution of the Home Buyer Tax Credit.

Similar analysis for the Chicago Region revealed that on average, 9,871 houses were sold before the crisis, 5,262 houses were sold after the market crashed, and 6,246 houses were sold with the help of the

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1 This evaluation of part of the American Recovery and Reinvestment Act, January 1, 2009 – November 30, 2009 was made possible with data and support provided by the Illinois Association of Realtors (IAR). The views expressed in this document are those of the authors of the study and do not reflect official positions of the IAR.

2 Worker, Homeownership, and Business Assistance Act, November 7, 2009 – April 30, 2010

3 We did not count Housing and Economic Recovery Act of 2008 because it is just an interest free loan which the consumer has to pay back.
HBTC. Therefore, the actual boost from the incentives was 984 houses (15,774 sales in 16-month) in the Chicago region.

The GAO report shows that the average tax return claim in Illinois was $7,100. However, the benefit to the state economy is much greater than the cost. According to a joint research done by RCF Economic and Financial Consulting Inc. and REAL, each housing sale will generate $27,000 in transaction costs. Furthermore, this $27,000 will be spent in the economy, generating and additional $17,820 in economic activity through the ripple effect.

Note: The economic crisis without the HBTC period runs from January 2008 to February 2009, and the economic crisis with the help of the HBTC period runs from March 2009 to June 2010. It usually takes one to two month for a contract to close. That’s why our second period has a two month lag from the HBTC official dates which run from January 2009 to April 2010.

However, the HBTC does put pressure on the housing market in the future. Firstly from the demand side, many people did not have the plan to buy a house right away, but they rushed to sign the contract before the deadline of the tax incentive. This inflated the sales number for the first half of 2010, while putting enormous pressure on the second half of the year. Pressure also comes from the supply side. Homeowners saw both sales and prices go up in the first half of year. This caused them to put their houses on the market, with hopes that the houses would be sold soon at a decent price. This combined with the foreclosed houses on the market pushed the housing inventory to a new height. Both demand side and supply side pressures indicate that the market will be flat for the rest of this year.
Appendix: Intervention Analysis

The intervention analysis is processed in two steps. In the first step we have to estimate an ARIMA time series model for the before shock period. In the second step, we assume that the time series structure holds for the aftershock periods, then we exam the change of means for the different periods.

First identify the events we want to analyze:

(1) Compared to before shock period (Jan 2003 to Dec 2007), the effect of sales during the economic crisis without the HBTC. The period is Jan 2008 to Feb 2009, 14 months in total.

(2) Compared to before shock period (Jan 2003 to Dec 2007), the effect of sales during the economic crisis with the HBTC. The period is March 2009 to June 2010, 16 months in total. The Home Buyer Tax Credit program runs from Jan 2009 to April 2010. However the effect on sales figure has one to two month delay.

Then, the difference between these two events is the effect of sales by the HBTC.

For Illinois, the before crisis housing sales is best fit by ARIMA model with a one month lag and a one year lag.

\[
ARIMA(1,0,0) * (1,0,0)_{12} \\
(1 - 0.778B)(1 - 0.856B^{12})y_t = \sigma_t
\]

Then we can write our intervention model as:

\[
y_t = \omega_0\delta_{t0} + \omega_1\delta_{t1} + \omega_2\delta_{t2} + \frac{1}{(1 - 0.778B)(1 - 0.856B^{12})}\sigma_t, \quad \delta_{t0} + \delta_{t1} + \delta_{t2} = 1
\]

which is the same as:

\[
y_t(1 - 0.7783B)(1 - 0.8559B^{12}) = \omega_0\delta_{t0}(1 - 0.7783B)(1 - 0.8559B^{12}) + \omega_1\delta_{t1}(1 - 0.7783B)(1 - 0.8559B^{12}) + \omega_2\delta_{t2}(1 - 0.7783B)(1 - 0.8559B^{12}) + \sigma_t
\]

Where

\[
\delta_{t0} = \begin{cases} 1, & \text{when } t = \text{Jan 2003 to Dec 2007} \\ 0, & \text{otherwise} \end{cases}
\]

\[
\delta_{t1} = \begin{cases} 1, & \text{when } t = \text{Jan 2008 to Feb 2009} \\ 0, & \text{otherwise} \end{cases}
\]

\[
\delta_{t2} = \begin{cases} 1, & \text{when } t = \text{March 2009 to June 2010} \\ 0, & \text{otherwise} \end{cases}
\]

We can estimate this equation by OLS because the auto correlated error term is transferred to iid error \((\sigma_t)\). The estimation result is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Illinois</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>w0</td>
<td>14,072***</td>
<td>9,871***</td>
</tr>
<tr>
<td>w1</td>
<td>8,076***</td>
<td>5,262***</td>
</tr>
<tr>
<td>w2</td>
<td>9,671***</td>
<td>6,246***</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.351</td>
<td>0.386</td>
</tr>
</tbody>
</table>
14,072 houses were sold in Illinois every month before the economic crisis. The number dropped to 8,076 sales per month in economic downturn without the present of HBTC. The average monthly sales number rose to 9,671 with the help of tax credit program. We can interpret the numbers in the same way for Chicago. The results for both Illinois and Chicago are statistically significant.

Reference: Box and Tiao, Intervention analysis with Applications to Economic and Environmental Problems, Journal of the American Statistical Association, 1975