

Housing Market Cycles and Duration Dependence in the United States and Canada

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Attention has recently been focused on the deterioration in the housing and credit markets in the United States and the effects that this may have on financial institutions and, more broadly, on financial stability. After an extended upswing, the rate of increase in U.S. house prices has slowed sharply, and prices have even declined in some areas. House price cycles play an important role in the consumption and savings decisions of consumers. Developments in housing markets can have a significant impact on performance in the banking sector and, thus, on the financial system, since residential mortgages account for a large share of the loan portfolios of Canadian banks. Therefore, it is important for policy-makers to have a good understanding of the cycles in house prices.

Canada and, until recently, the United States have been experiencing the longest period of rising house prices on record. A natural question is whether such a long expansion is more or less likely to end than a shorter one; that is, whether cycles in the housing market exhibit duration dependence. If there is duration dependence in housing cycles, then turning points can, to some extent, be predicted by the length of the phase. Thus, duration could prove to be a useful indicator for policy-makers. This is particularly interesting in the current context, given that the surge in house prices in the United States seems to be over, while Canadian house prices continue to increase.

The aim of this study is to examine house price expansions and contractions in the United States and Canada using a panel data sample of 137 cities, spanning a period of at least 20 years.¹ The goal is to improve our

1. A panel data sample creates more variability by combining variation across micro units with variation over time. With this more informative data, more efficient estimation is possible.

understanding of housing market cycles in North America. First, we compare housing market cycles in the United States and Canada with respect to duration, size, and correlation. We then estimate a model² to test for duration dependence during periods of expansion and contraction in house prices.

This study builds on the housing cycle literature and, to the best of our knowledge, is the only one that tests specifically for duration dependence in housing market cycles. One reason for the lack of such an approach may be the lack of long-term time series for aggregate house prices, which makes time-series econometric estimates unreliable. To address this problem, we use a panel data estimation technique.

Descriptive Analysis of House Price Cycles

Housing market cycles in Canada and the United States exhibit a number of differences. First, there have been fewer national housing cycles in the United States than in Canada (two U.S. contractions since 1975 compared with four in Canada since 1980). Second, aggregate real house prices have been considerably less volatile in the United States than in Canada, with a standard deviation in growth of 3.5 per cent, compared with 6.5 per cent in Canada. Finally,

2. We construct indexes of U.S. real house prices using the city- and national-level nominal house price indexes from the Office of Federal Housing Enterprise Oversight deflated by the CPI data published by the Bureau of Labor Statistics. Canadian house prices can be measured using data on the average selling price compiled from the multiple listing service (MLS). The MLS series are then deflated using the Canadian national consumer price index from Statistics Canada. Both of these data sources have limitations that are described in detail in Cunningham and Kolet (2007).

housing market cycles in Canada have tended to be shorter and sharper than those in the United States, particularly during periods of declining prices. The longest nationwide contraction in Canada occurred in the early 1980s and lasted three years, and the accompanying price declines were generally as large or larger than in the United States.³

An analysis of aggregate housing market cycles is not sufficient, however, because housing is inherently local. The analysis of city-level data shows that local housing cycles in the two countries have been quite similar overall: the average expansion lasts 5.8 years, with an average increase in real prices of about 32 per cent in both countries, and during a typical contraction, real prices decline by about 10 per cent in both countries. Contractions are shorter in Canadian cities, however, lasting an average of 3.5 years compared with 4.4 years in U.S. cities.

It is important to note that unconditional correlations between housing cycles in Canada and the United States do not imply causality between the two countries.

A Model of Duration Dependence

To more formally examine the full course of housing cycles, we estimate a duration model. Also known as survival analysis, this technique, commonly used in microeconomics, has also been used in several studies of economic cycles, most notably stock market and business cycles. It is particularly relevant for our work because a natural question regarding house prices is, “Given the recent increase in home prices, what is the probability of the expansion ending?”

We estimate separate discrete-time survival models for expansions and contractions in housing cycles:

$$Pr(y_{it} = 1) = \Phi(DUR3...DUR10UP, GINC, GPOP, DRM).$$

The dependent variable is a binary variable, y_{it} , which represents the phase that city i is in at time t . In the model for expansions, $y_{it} = 1$, if

city i is in an expansion phase, and $y_{it} = 0$, if it exits the expansion phase in period t . This dependent-variable phase is estimated using a standard probit model in which the right-hand side contains a variable that measures the duration in the current phase ($DUR3...DUR10UP$), along with other variables that control for fundamental factors affecting the duration of housing cycles (income, $GINC$; population, $GPOP$; and mortgage rates, DRM).

A non-zero coefficient on the duration variable indicates duration dependence. More specifically, a statistically significant positive coefficient implies that the longer the current phase has lasted, the more likely it is to continue. Conversely, a significant negative coefficient on the duration variable implies that the longer the current phase has gone on, the more likely it is to end. A statistically insignificant coefficient means that the phase is duration independent.

Results and Implications

We find that the longer a housing expansion lasts, the more likely it is to move into a contraction phase.⁴ In contrast, contractions seem to have no duration dependence, but the results are sensitive to the particular specification. The control variables (i.e., the fundamental factors— income, population, and interest rates) explain most of the transition dynamics of contractions, but there is a role for duration to help us predict expansions. The asymmetric nature of our findings on duration dependence may be due to the fact that duration acts as a proxy for other variables that could explain the transition out of housing market expansions. One potential interpretation is that the duration dependence in expansion cycles may be a proxy for speculative activity. Speculation may only appear in expansion phases because, unlike other asset markets, short selling of houses is not possible.

These results are interesting for policy-makers for several reasons. First, the findings and estimation results suggest that fundamental factors, notably interest rates, have a significant impact

3. Commodity price shocks have had larger effects on the Canadian economy than on the U.S. economy and may explain some of the differences in housing and business cycles in the two countries.

4. The duration dependence results for expansions are remarkably robust, but the contraction results are more sensitive. Furthermore, we find the magnitude of the duration dependence in expansions to be economically significant.

on the transition out of both contractions and expansions.⁵ Second, the fact that duration is significant for expansion phases could prove to be a useful indicator in predicting the length of housing market expansions. Since financial institutions in Canada are exposed to the housing market through their residential mortgage loan portfolio, the ability to predict the length of housing market expansions could be useful in assessing the expected impact of housing market developments on these financial institutions and on the financial system as a whole.

References

Cunningham, R. and I. Kolet. 2007. "Housing Market Cycles and Duration Dependence in the United States and Canada." Bank of Canada Working Paper No. 2007-2.

5. Rising interest rates tend to decrease the survival probability of expansions. We find that the real policy rate variable is robust to all our specification changes, and its effect on survival probabilities is statistically and economically significant. In particular, for contractions, the change in the real policy rate has a large effect of roughly the same magnitude as growth in income per capita.