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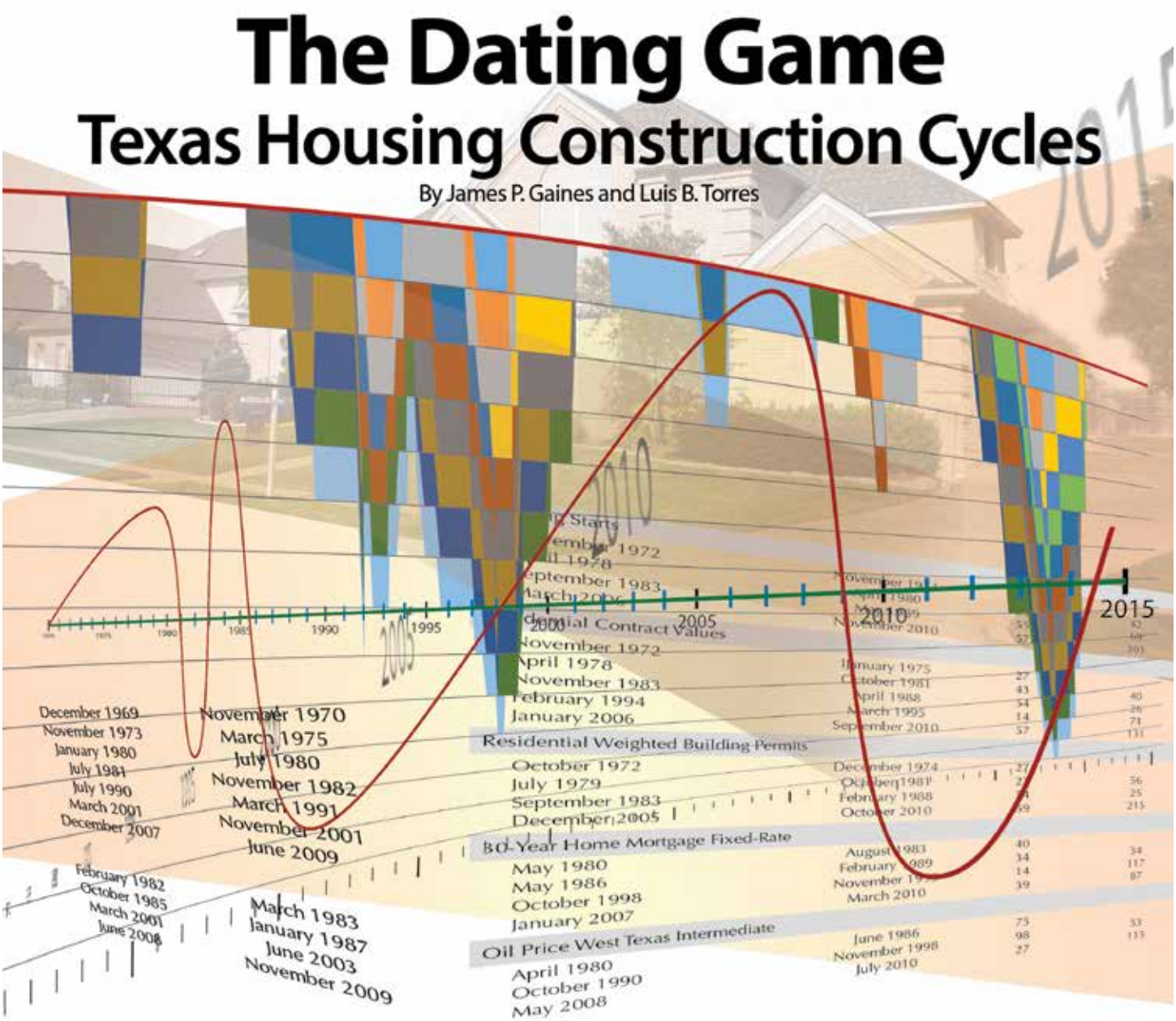
# The Dating Game

## Texas Housing Construction Cycles

By James P. Gaines and Luis B. Torres

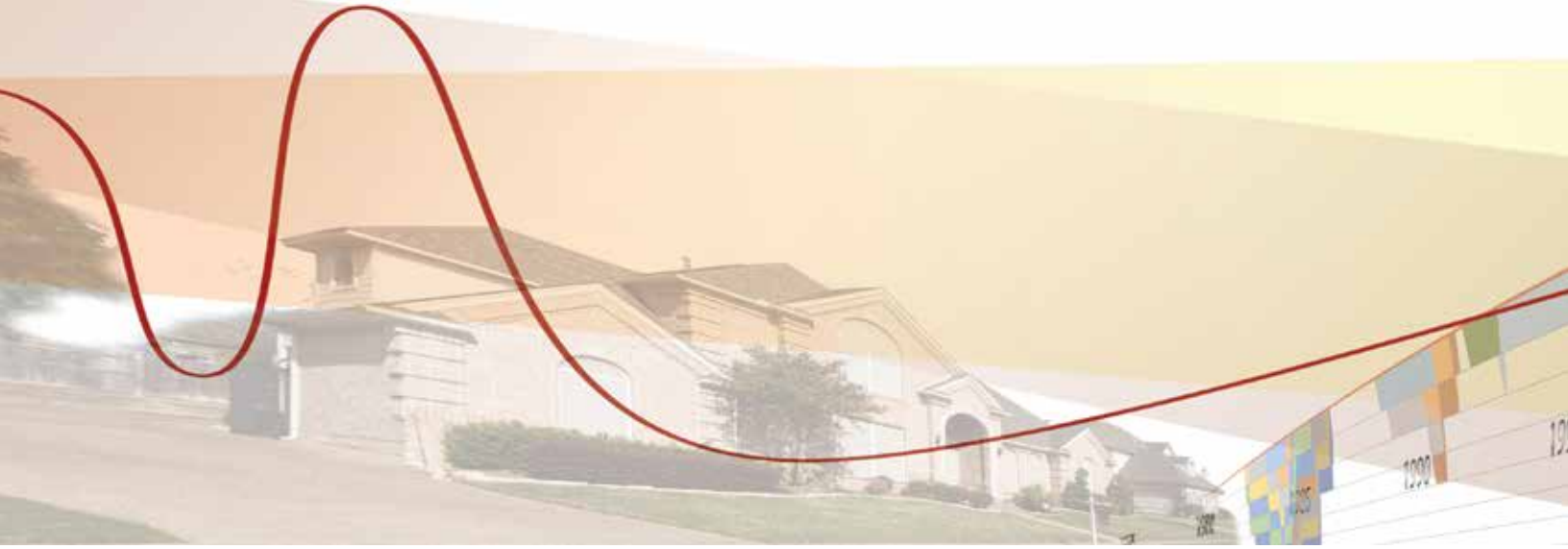



Just as the health of the U.S. housing market influences the national economy, Texas' housing sector plays a significant role in the state's economic expansions and recessions. Measuring the relationships between key economic performance measures and housing cycle changes provides a method of anticipating the direction and magnitude of future changes.

The National Bureau of Economic Research (NBER) Business Cycle Dating Committee has been dating U.S. expansions and recessions for the past 85 years. The committee identifies business cycle turning points from a selected list of economic variables that represent aggregate economic activity.

The reason for using multiple economic series is that no single proven and accepted indicator of an observed business cycle exists. No single series can completely capture all upturns and downturns in economic activity. Given that recessions can be caused by different factors and no two recessions are totally alike, the probability is low that any one data series, by itself, will perform best over all the peaks and troughs. To increase the probability of getting true signals and reduce the chances of false ones, an array of indicators representing a cross section of economic activities or sectors were chosen from a wide range of economic sectors and processes to estimate the date a business cycle turns.

Similarly, business cycles in different regions and economic sectors are not necessarily the same. For example, the U.S. economy did not register a downturn in 1985, while the Texas economy suffered one of its worst as a consequence of falling oil prices (Table 1). The recent boom and bust in the housing market, especially in residential construction, and its impact on overall economic growth at the national and state level highlights the need for identification of economic indicators that most influence the residential construction sector. The



housing market's size and volatility make it an important sector in the overall economy's growth at the national and regional level.

Until now, there have been no attempts to determine turning points in local residential construction economic activity and date the Texas residential construction business cycle. This is especially critical in the absence of a timely measure of state output in the residential construction sector. The Real Estate Center has launched a program to determine a consistent and reliable procedure to monitor and date the Texas residential construction cycle. Center researchers chose from the available measures of residential construction and the variables that represent the most comprehensive measures of the direction of this important sector. Based on the data, Center research economists will determine turning points in a manner similar to the NBER procedure.

**Table 1. Chronology of U.S. and Texas Business Cycles**

| Peak Date | Trough Date | Months Contraction, Peak to Trough | Months Expansion, Trough to Peak |
|---|---|---|---|
| **U.S. Economy** | | | |
| December 1969 | November 1970 | 11 | 106 |
| November 1973 | March 1975 | 16 | 36 |
| January 1980 | July 1980 | 6 | 58 |
| July 1981 | November 1982 | 16 | 12 |
| July 1990 | March 1991 | 8 | 92 |
| March 2001 | November 2001 | 8 | 120 |
| December 2007 | June 2009 | 18 | 73 |
| **Texas Economy** | | | |
| February 1982 | March 1983 | 14 | |
| October 1985 | January 1987 | 16 | 32 |
| March 2001 | June 2003 | 28 | 171 |
| June 2008 | November 2009 | 18 | 61 |

The coincident index from the Dallas Federal Reserve does not identify an economic downturn for Texas during the 1970s.

Source: National Bureau of Economic Research (NBER) and Dallas Federal Reserve

## Cycle Concepts

The objective is to establish a chronology of the residential (single and multifamily) construction business cycle in Texas based on key economic performance measures such as employment, housing starts and home sales. The chronology comprises alternating dates of economic high points (peaks) and economic low points (troughs). A contraction is the period between a peak and a trough.

Expansions and contractions can last from a few months to more than a year. Typically, expansions last longer and are considered the normal state of the economy because most recessions are much briefer. During either a contraction or an expansion, brief, minor reversals in construction activity may occur. Thus, a recession may include a period of much slower decline or even a short expansion followed by further decline. Similarly, an expansion may include a period of much slower gain or even a short period of contraction followed by further growth.

One of the defining characteristics of a business cycle is how economic variables move together over the cycle. This is referred to as "co-movement." A series can be classified based on the timing of these movements. If they are coincident (move together with the cycle), some lead the overall cycle (leading indicators) and some variables lag the overall cycle (lagging indicators).

Coincident series, such as output and employment, reflect current economic conditions and generally move in tandem with the overall business cycle. Leading indicators reflect future activity and move ahead of the construction cycle, such as building permits and new orders. Finally, lagging indicators move behind the cycle.

A cycle is detected and described by isolating and identifying the timing of major turning points in overall activity, after which those dates are used to mark off expansions and contractions. Market cycle fluctuations occur along the overall, long-term trend of the economic activity. Over a 40- or 50-year period of overall growth in the volume of residential construction, there may be several contractions and expansions in the residential construction cycle.

## Texas Residential Construction Cycles

Acting as the residential cycle dating committee, Real Estate Center research staff applied their judgment based on the above definitions of contractions and expansions and their knowledge of and expertise within the residential market in Texas. There is no fixed rule to determine whether a given decline in activity is only a short interruption of an expansion or a true contraction or, conversely, if a sudden increase in activity is only a brief interruption of a contraction or a true expansion.

**Table 2. Chronology Coincident Housing Market Variables Business Cycles**

| Peak Date | Trough Date | Months Contraction, Peak to Trough | Months Expansion, Trough to Peak |
|---|---|---|---|
| Nonfarm Employment | | | |
| February 1982 | April 1983 | 15 | |
| November 1985 | December 1986 | 14 | 32 |
| March 2001 | July 2003 | 29 | 172 |
| August 2008 | November 2009 | 16 | 62 |
| GDP | | | |
| IV-Quarter 1981 | IV-Quarter 1982 | 15 | |
| III-Quarter 1985 | I-Quarter 1987 | 21 | 36 |
| III-Quarter 2000 | III-Quarter 2001 | 15 | 165 |
| II-Quarter 2008 | II-Quarter 2009 | 15 | 84 |
| Construction Wages | | | |
| IV-Quarter 1981 | II-Quarter 1989 | 93 | |
| II-Quarter 2001 | I-Quarter 2003 | 36 | 147 |
| III-Quarter 2008 | I-Quarter 2011 | 33 | 57 |
| House Price Index | | | |
| II-Quarter 1986 | I-Quarter 1989 | 36 | |
| I-Quarter 2009 | II-Quarter 2011 | 30 | 243 |
| Residential Construction Employment | | | |
| February 2008 | April 2011 | 39 | |
| Residential Construction Wages | | | |
| I-Quarter 2007 | II-Quarter 2011 | 54 | |
| Existing Home Sales | | | |
| September 1979 | August 1982 | 36 | |
| May 1984 | April 1986 | 24 | 22 |
| April 1994 | February 1995 | 11 | 97 |
| December 2006 | September 2010 | 46 | 143 |
| All Mortgage Loans Past Due | | | |
| IV-Quarter 1981 | I-Quarter 1987 | 66 | |
| II-Quarter 2000 | III-Quarter 2001 | 18 | 162 |
| I-Quarter 2007 | I-Quarter 2010 | 21 | 39 |

Source: Real Estate Center at Texas A&M University

The procedure for determining turning points consists of identifying economic activity based on a range of indicators, placing considerable emphasis on monthly indicators. The duration and amount of a change in activity typically determines a significant change in activity that warrants it being identified as a true turning point.

Five key economic variables emerged as leading indicators to estimate the Texas residential construction cycle:

- housing starts;
- residential contract values;
- residential building permits;
- the 30-year home mortgage fixed rate; and
- West Texas intermediate (WTI) crude oil price.

The residential construction process, which typically takes from four to six months, starts when a building permit is issued. Building permits provide an early, direct indicator of the level of housing starts in the coming months. Permit information also includes the contract value of the proposed residence. Residential building permits and contract values are broad measures of the housing sector that signal the timing of economic activity, whether up or down. Permits and starts exhibit a strong, positive correlation over time; however, at a downturn they can move apart as permitted structures fail to be started.

Another leading series is the conventional 30-year fixed mortgage interest rate, which represents the financing cost of purchasing a home by a homebuyer. Although mortgage rates play an important role in demand for housing, relatively less weight is given to this residential construction cycle leading indicator as its influence is somewhat less direct. Moreover, the mortgage interest rate at any given time is influenced by other factors external to housing market conditions. Most recently in the past several years, monetary policies by the Federal Reserve have been directed at keeping the mortgage interest rate low to influence overall housing activity.

In a similar manner, the price for WTI crude oil, the third leading indicator, is influenced by numerous global factors that do not tie directly to housing activity. However, WTI oil prices are another key measure because the energy sector is such an important influence on the overall Texas economy, employment, incomes and housing demand.

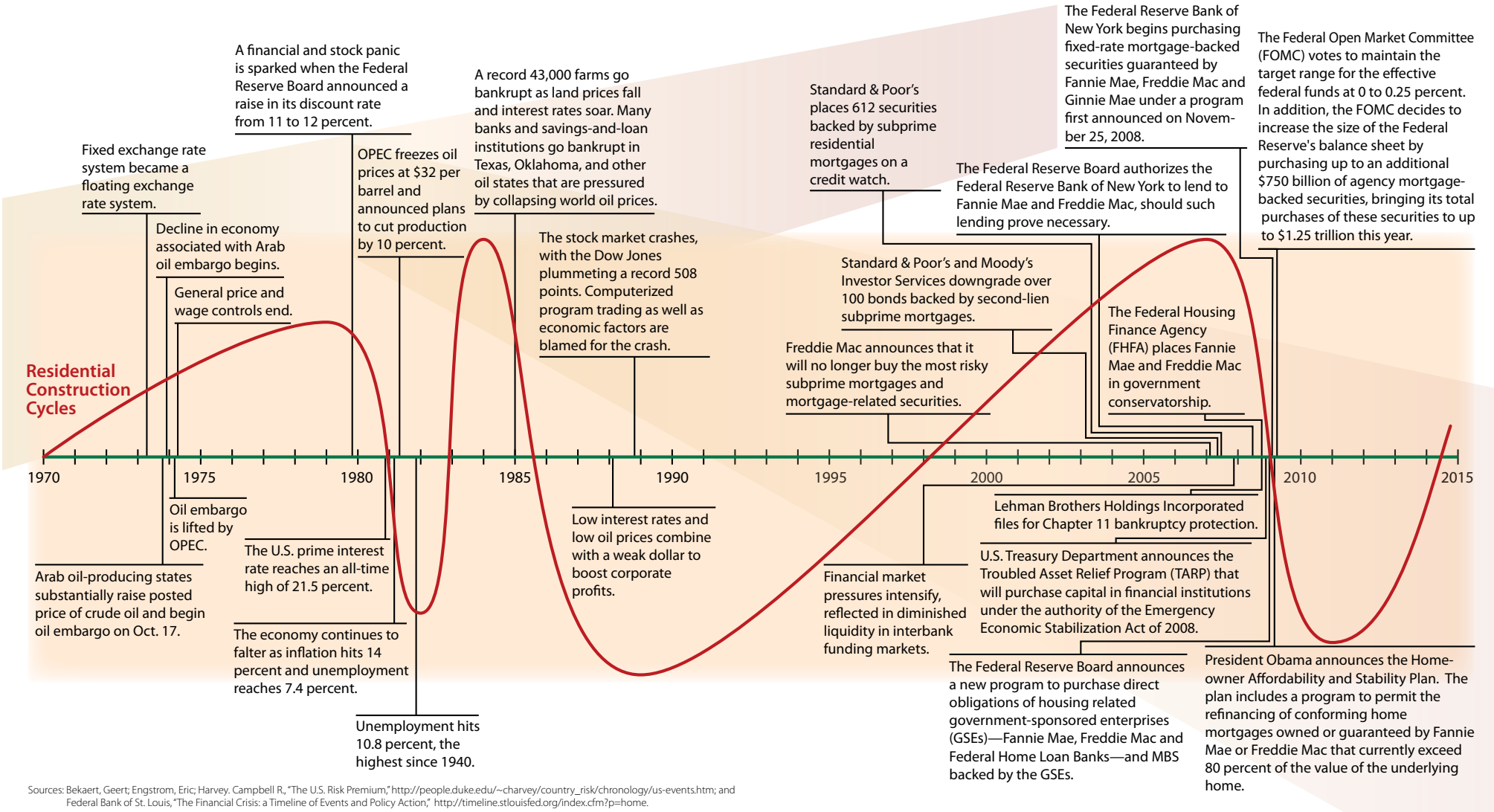
The chronology of peaks and troughs and the durations of the expansions and contractions for the leading series indices are depicted in Table 2.

Several coincident series reflect when activity took place, making them better indicators of housing sector peaks and troughs. For this analysis, eight Texas economic series were included as coincident indicators. They were:

- total nonfarm employment,
- gross state product,
- construction wages,
- residential construction wages,
- FHFA house price index,
- residential construction employment,
- existing home sales and
- mortgage loans past due.

During the construction process, labor and capital are employed in various degrees until the house is completed. While capital is difficult to measure directly, the Bureau of Labor Statistics (BLS) provides different measures of labor.

**Figure 1. Residential Construction Business Cycles**




Sources: Bekaert, Geert; Engstrom, Eric; Harvey. Campbell R., "The U.S. Risk Premium," http://people.duke.edu/~charvey/country_risk/chronology/us-events.htm; and Federal Bank of St. Louis, "The Financial Crisis: a Timeline of Events and Policy Action," http://timeline.stlouisfed.org/index.cfm?p=home.

Residential construction employment and wages can be used to measure the intensity and timing of residential construction activity. Because employment data do not differentiate between full-time and part-time workers, they can be more misleading than total wages. Real wages paid fluctuate with hours worked and worker productivity. These data are not available on a monthly basis. Nevertheless, both series give a better picture of the timing and magnitude of construction activity than other coincident series available and are relied on more heavily to define turning points in housing market activity.

Of the other coincident variables considered, the Federal Housing Finance Agency (FHFA) Texas house price index is directly tied to the regional single-family existing housing market. But the index is considered "sticky" to downward movements, only registering declines during deeper contractions, and not falling during milder recessions. The price index also lags the labor coincident series of employment and wages. In addition, current house prices have embedded in them future price expectations that affect the price index's ability to measure turning points in the construction cycle. With the exception of all mortgage

**Table 3. Chronology Leading Housing Market Variables Business Cycles**

| Peak Date | Trough Date | Months Contraction, Peak to Trough | Months Expansion, Trough to Peak |
|---|---|---|---|
| Housing Starts | | | |
| November 1972 | November 1974 | 25 | |
| April 1978 | April 1980 | 25 | 42 |
| September 1983 | May 1989 | 55 | 69 |
| March 2006 | November 2010 | 57 | 203 |
| Residential Contract Values | | | |
| November 1972 | January 1975 | 27 | |
| April 1978 | October 1981 | 43 | 40 |
| November 1983 | April 1988 | 54 | 26 |
| February 1994 | March 1995 | 14 | 71 |
| January 2006 | September 2010 | 57 | 131 |
| Residential Weighted Building Permits | | | |
| October 1972 | December 1974 | 27 | |
| July 1979 | October 1981 | 27 | 56 |
| September 1983 | February 1988 | 54 | 25 |
| December 2005 | October 2010 | 59 | 215 |
| 30-Year Home Mortgage Fixed-Rate | | | |
| May 1980 | August 1983 | 40 | |
| May 1986 | February 1989 | 34 | 34 |
| October 1998 | November 1999 | 14 | 117 |
| January 2007 | March 2010 | 39 | 87 |
| Oil Price West Texas Intermediate | | | |
| April 1980 | June 1986 | 75 | |
| October 1990 | November 1998 | 98 | 53 |
| May 2008 | July 2010 | 27 | 115 |

Source: Real Estate Center at Texas A&M University

loans past due, the remaining variables are broader measures of the Texas economy — construction wages, GDP and nonfarm employment — and do not necessarily reflect specific housing sector activity. They may be increasing (decreasing) when housing activity is decreasing (increasing). The final coincident series, all mortgage loans past due, represents regional credit conditions and does not necessarily measure direct activity in the residential housing market.

The chronology of peaks and troughs and the durations of expansions and contractions for the coincident series indices are depicted in Table 3.

## Dating Residential Construction Cycles

Because of limited data series availability, the evaluation period of this report is from January 1970 to May 2014. All data series were seasonally adjusted and dollar amounts were measured in real terms deflated by an estimate of the Texas Consumer Price Index (CPI). The Texas CPI is estimated from an interpolation procedure of the CPI data for Dallas-Fort Worth and the Houston-Galveston-Brazoria areas for all urban consumers, with a base period of 1982–84.

Each series was plotted to identify turning points and thereby define specific cycles for each series. Subsequently, the specific information was distilled into a single set of turning points that constitute the chronology of the aggregate cycle for residential construction in Texas (Figure 1).
Identifying the specific dates of the cycle troughs required weighing the behavior of the chosen coincident and leading variables. Some data series were available only quarterly and others were subject to regular revisions and measurement errors. For these reasons, it was preferable to refer to a variety of monthly indicators to determine the months of peaks and troughs. Greater emphasis was placed on measures that directly represented residential construction activity than to more general indicators of the Texas economy.

The direct variables included residential construction employment and wages, weighted residential permits, residential contract values and housing starts. Unfortunately, the first two coincident variables were available only since 1990, which affected the researchers' ability to identify peaks and troughs during the 1970s and 1980s. However, the other series provided information to help identify turning points during both of the earlier decades. There were no fixed rules about the weights assigned to the various indicators or about other measures that contributed to the process of dating the business cycle.

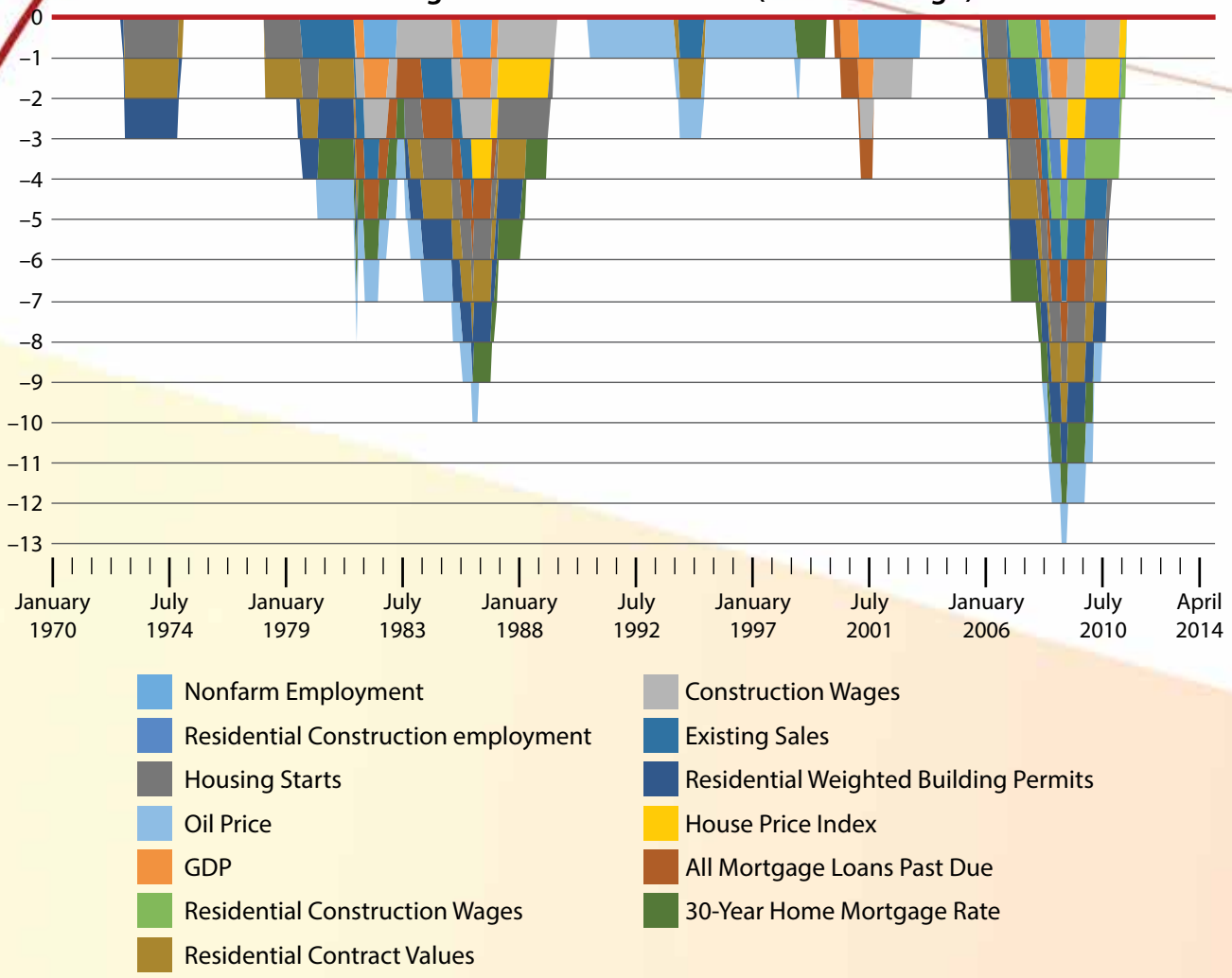
In addition, a timeline of historic economic events for the past 40 years was used as a reference to complement the identification of turning points.

A contraction in residential construction was defined as a period of significantly falling economic activity spread across the construction sector and lasting more than a few months. The turning points were normally visible in the following leading and coincident variables: housing permits, residential contract values, housing starts, residential construction employment and residential construction wages. The trough (peak) marked the end of the declining (increasing) stage and the start (end) of the rising (falling) stage of the business cycle. Economic activity is typically below normal in the early stages of an expansion and may remain so well into the expansion.

Based on the behavior of the coincident and leading indicators included here, three peaks and troughs in the Texas residential construction business cycle were identified (Table 4).

The three residential market-leading indicators were found to lead a peak approximately 12 months ahead and a trough about eight months ahead. The dates of these peaks and troughs were consistent with declines (increases) in existing home sales and the house price index.

## Figure 2. Chronology of Coincident and Leading Variables Contractions (Peak to Trough)




Source: Real Estate Center at Texas A&M University

The first major contraction, from September 1979 to August 1982, was due to the rise in interest rates in the United States as the Fed raised the fed funds rate to subdue rising inflation (Figure 2). This led to a fall in international oil prices as international interest rates rose, causing a slowdown in U.S. and world economic activity and resulting in a drop in world demand for oil. The contraction from May 1984 to March 1989 was the deepest and longest lasting. The downturn in oil prices from the global excess supply of oil caused a major recession in the Texas economy, reflecting the fortunes of the energy sector. The latest contraction (January 2007–June 2011) reflected the bursting of the national housing bubble and its effect on the overall economy and the financial sector, which led to the largest downturn in economic activity in the United States and the world since the Great Depression of the 1930s.

The Texas residential cycle was not totally coincident with the U.S. or Texas business cycles. For example, the Texas residential construction sector did not register a contraction in 2001 as did the U.S. and Texas economies. Expansions and contractions of Texas' residential construction cycle were typically longer than national or Texas business cycles.

**Table 4. Chronology of Texas Residential Construction Cycles**

| Peak Date | Trough Date | Months Contraction, Peak to Trough | Months Expansion, Trough to Peak |
|---|---|---|---|
| September 1979 | August 1982 | 36 | |
| May 1984 | March 1989 | 59 | 22 |
| January 2007 | June 2011 | 54 | 215 |

Source: Real Estate Center at Texas A&M University

For an expanded report, see *Dating the Business Cycle for Texas Residential Housing Construction* at recenter.tamu.edu/pdf/2086.pdf.

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## THE TAKEAWAY

The Real Estate Center, as part of its ongoing research efforts, will continue to monitor the coincident and leading indicator series to estimate future residential market cycles.

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## About the Real Estate Center

The Real Estate Center at Texas A&M University is the nation's largest publicly funded organization devoted to real estate research. The Center was created by the Texas Legislature in 1971 to conduct research on real estate topics to meet the needs of the real estate industry, instructors and the public.

Most of the Center's funding comes from real estate license fees paid by more than 135,000 professionals. A nine-member advisory committee appointed by the governor provides research guidance and approves the budget and plan of work.

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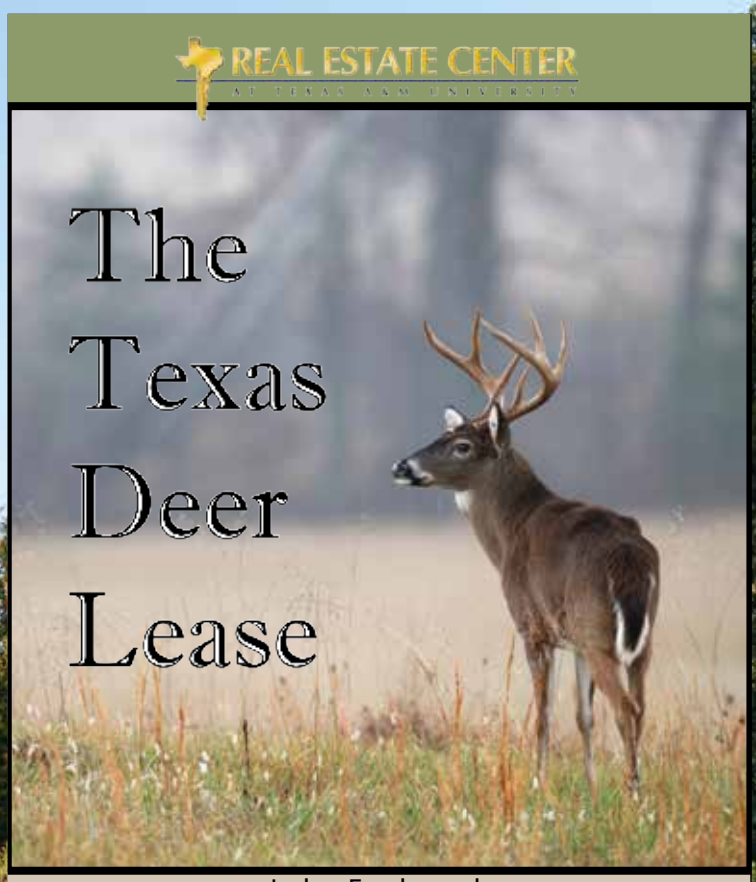


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