Joint Center for Housing Studies
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Developing a Leading Indicator for the Remodeling Industry

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Introduction

Homeowner remodeling expenditure is currently estimated at $280 billion dollars a year, accounting for almost 40 percent of all residential construction and improvement spending and more than 2 percent of the U.S. economy. Given the relative size and importance of the home improvement industry, there is a surprisingly limited amount of data available on a consistent and timely basis. The primary source of data, the Commerce Department's quarterly survey *Expenditures for Residential Improvements and Repairs*, commonly referred to as the C-50 report, is generally released several quarters after the reference period and the quarterly numbers are unusually volatile. In an effort to improve the timeliness and stability of the data series, the Joint Center for Housing Studies developed the Remodeling Activity Indicator (RAI), which estimated current activity and expenditure. While this and other efforts helped provide the industry with timely and stable estimates of remodeling activity, there was still no indicator to provide a forward-looking approach to measuring the industry. There have been some attempts at developing longer-term forecasts using econometric models, but there has been little work done in the field of near-term projections of activity.

This paper describes the process for developing the Leading Indicator of Remodeling Activity (LIRA), designed to estimate quarterly current and future home improvement expenditures by homeowners. The indicator, measured as an annual rate-of-change of its components, provides a short-term outlook of remodeling activity, with a horizon of three quarters. Like all leading indicators, it is intended to also signal turning points in the business cycle of the home improvement industry.

I. Research Context

Leading Indicators and Business Cycle Theory

One of the main characteristics of leading indicators is their ability to predict upturns and downturns in activity. A leading indicator, therefore, must not only *lead* a sector in the business cycle, but also be able to accurately predict its turning points. Accurately forecasting the cyclical nature of an industry however, is difficult. For one thing, "cycles" is a rather misleading concept, as the peaks and troughs don't tend to repeat at regular time intervals. The lengths (from peak to peak or from trough to trough) vary, so cycles are not mechanical in their regularity.[1] Moreover, the various drivers of a given industry can have different cycles, making it difficult to understand what the aggregate effect will be. For these and other reasons, leading indicators can be a tricky and sometimes a fairly inexact science. They do however, provide a good estimate of trends and general levels of activity.

Several approaches to leading indicators have been produced in both academic and industry literature. One of these approaches is the technique used by the Conference Board, the organization that manages the most popular and widely-cited leading indicator on the U.S. macroeconomy. This technique, which has been mimicked by many other efforts measuring national and international macroeconomic and sector-specific activity, consists of building a diffusion index based on the change of a series of input variables.[2]

Another approach, spearheaded by Stock and Watson, utilizes a vector autoregressive technique to specify a statistical model. The model is based on the notion that the co-movements in many macroeconomic time series can be captured by a single unobserved variable representing the overall state of the economy. The result, named the Experimental Coincident Indicator, measures the probability of a recession in a given time period. The Experimental Leading Index (XLI), based on seven leading indicators, is a forecast of the percentage growth of the coincident index (at an annual rate) for the following six months.[3] While the Stock Watson leading indicator (XLI) and related series were retired in December 2003, several successors using similar methodologies are available, most notably the Chicago Fed National Activity Index (CFNAI).

II. Research Challenges

Introduction of new data series

The development of this project was borne mostly from the need for a reliable leading indicator for home improvement activity: however, the recent introduction of several new, relevant data series made this effort particularly important and timely. Several new data series relating to remodeling activity have recently been released, contributing to a relatively barren

[1] Banerji, Anirvan, 1999. For a more complete description of modeling business cycles please see: Gordon, Robert 2005; Klein et al. 1990; Moore, Geoffrey 1983; and Romer, Christina 1999.
[2] See Conference Board website (www.conference-board.org) for further detail on methodology.
[3] See Stock, J. and M. Watson 1990 and 2003.

landscape of remodeling-specific data. Because data specific to home improvement activity is so limited, capturing remodeling trends through these sources provides a unique opportunity.

In recent years, the National Association of Home Builders has produced the Remodeling Market Index (RMI), a survey that asks professional remodelers about their current and future business expectations. Similarly, in March of 2005, the National Association of Realtors debuted a new Pending Home Sales Index (PHSI), which measures home purchase contract activity. Because of their potential ability to measure remodeling activity, and particularly because of their potential lead of this activity, the consideration of these and other variables is important.

Also, beginning with the third quarter of 2006, Freddie Mac began releasing quarterly cash-out volume statistics for home mortgage refinancing. The data are available for the U.S. from 1993 and include statistics on cash-out volume as a percentage of refinance originations volume, estimates of total home equity cashed out, and estimates of the total increase in first lien mortgage debt due to cash-outs and consolidation of existing second mortgages. Studies[4] have shown that a significant share of homeowner improvements is financed through cash-out withdrawals from the refinancing of their home.

The challenge presented with these data series however, is that the historical time series is very short. Short data series can present a number of problems in developing leading indicators, and most notably, the relationship between the indicator and measured outcome may be volatile. For that reason, some econometric or statistical techniques become difficult to implement, and the results are challenging to interpret. Given the priority in the inclusion of the new data series, however evaluating the tradeoff was necessary.

Volatility of C-50 Series

Exacerbating the difficulty in measuring the cyclical nature of remodeling activity is the unusual volatility of the C-50 data. Because the C-50 numbers are the only publicly-released national series available on a quarterly basis, the leading indicator was designed to lead the C-50 numbers. As Figure 1 below reveals, the C-50 data series is a particularly volatile series, with reason to believe that much of this volatility is random.

The data for the household survey of the C-50 are obtained from household members as part of the Consumer Expenditure Surveys (CES) conducted by the Bureau of Labor Statistics.

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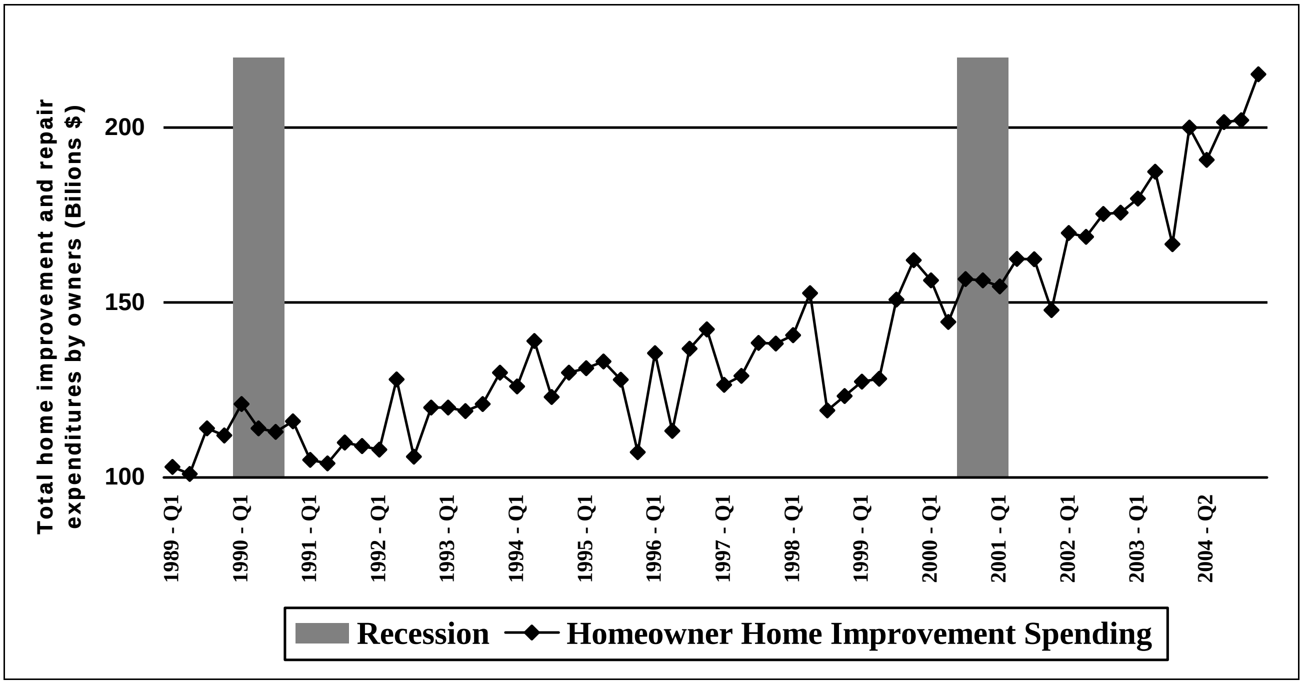
[4] See Martin-Guerrero, Alvaro 2004; Canner et al. 2002.

The expenditures covered by the survey are those that respondents can be expected to recall fairly accurately for three months or less, including expenditures for maintenance, repairs and improvements of residential property. Each sample household is interviewed once per quarter for five consecutive quarters.[5]

One of the major sources of volatility of the C-50 numbers is the size of the sample. The survey targets about 7,500 housing units for interviews per quarter, of which about 4,000 are owner-occupied. This sample is then weighted up to the national total. This effort is problematic for a few reasons. For one, a smaller sample has a higher sample error. Sampling error reflects the fact that only a subset was surveyed rather than the entire population. Smaller samples, therefore, have a higher likelihood of either missing households with large expenditures, or including them and therefore overestimating national expenditures. Because the CES is designed to gather information on small, frequent purchases such as food and clothing, it is often hard to get an accurate measure of large, relatively infrequent expenditures such as remodeling. In 2005, for example, remodeling expenditures of $20,000 accounted for over 60 percent of annual expenditures. Likewise, expenditures of $50,000 accounted for over 40 percent of annual expenditures.[6] Only about 2.5 percent of homeowners report levels of expenditure of $20,000 or more, and less than one percent of homeowners account for spending of $50,000 or more. For example, if a household in the survey undertakes a very large remodeling project in a given quarter and that household has a high weight to the national total, remodeling expenditures in that quarter will be very high. If that same household has no activity the next quarter, the weighted totals will drop significantly.

[5] See U.S. Census website, “Survey Methods and Reliability of Data” appendix.
[6] JCHS tabulations of the 2005 American Housing Survey.

Figure 1: Quarterly Home Improvement Data is Particularly Volatile



Source: U.S. Census Bureau, Construction Statistics, C50 series

Furthermore, the C-50 series does not seem to consistently exhibit the same cyclical nature of the broader economy. In the two national economic recessions since 1990, the C-50 showed very small declines. To some extent, this may be an example of the particularly resilient nature of the remodeling industry. On the other hand, there may be issues in the measurement and methodology of calculating the C-50 that are masking "real-life" downturns that are more in line with the broader economy. In both cases, this presents a particular challenge in the development of the leading indicator.

If the leading indicator is to use the C-50 as it benchmark, and attempts to predict its cycles, this task becomes increasingly difficult with the particularly high random volatility of the data series. For that reason, the methodology in developing the LIRA is one that attempts to predict the general trend of activity, but reduce some of the random volatility of the benchmark series to create a series that is more stable and hopefully more closely aligned with actual activity and expenditure levels.

III. Developing the Leading Indicator: The Theoretical Approach

Overview of the Method of Developing the Leading Indicator

The LIRA was created to provide the home improvement industry with a timely and accurate estimation of changes in spending activity by homeowners, as well as an estimate of near-term activity, with a horizon of three quarters. On a quarterly basis, the LIRA tracks the annual volume of homeowner expenditures in home improvements and repairs from the C-50 series using the four-quarter moving averages of several indicators that are associated with homeowner maintenance and improvement activity. The annual rates-of-change for the input components of the LIRA are lagged differentially, meaning that they have a different timing relationship with home improvement spending. This relationship was determined by evaluating which lag produced the best correlation with annual rate-of-change of homeowner remodeling expenditures. The input variables were then weighted according to their correlation with the C-50 series and their volatility. Finally, the components were integrated into one four-quarter rate of change that constituted the LIRA.

Identification of Candidates for Input Variables

The first phase of the project involved building a list of potential inputs. The identification of input components derived from the following criteria: they needed to have direct or indirect influence on remodeling activity, and they needed to have a significant lead on the activity. In other words, they needed to be drivers of remodeling activity. To begin, a list of broad categories of indicators that were thought to be drivers of the remodeling industry was established. These categories were as follows: consumer plans for future remodeling, professional contractor sentiment on future business activity, housing market activity, macroeconomic conditions, financial market conditions, and consumer confidence.

Consumer plans for future remodeling have obvious implications for the outlook on the remodeling market. It is also important to capture housing market activity, as remodeling expenditure tends to move in tandem with other housing market activity. In addition to remodeling- and housing-specific inputs, some macroeconomic and financial indicators were included to capture broader economic trends. While the remodeling market tends to move closely with the home building market, remodeling activity does tend to be a bit more resilient than new construction. The inclusion of other economic factors therefore allows us to capture future changes to the remodeling industry that are not present in other aspects of the housing market. Additionally, macroeconomic and financial health variables capture some of the cyclicality in the general economy that remodeling-specific variables might not.

Table 1: List of Input Candidates

Remodeling-Specific Candidates
NAHB's Remodeling Market Index
Residential Remodelers Employment: Hours worked at remodeling firms
Consumer and Professional Confidence
Dow Jones Business Barometer
University of Michigan Consumer Expectation Index
Conference Board Consumer Expectation Index
General Construction and Housing-Related Industry
Existing Home Sales
Pending Home Sales Index
New Homes Sold
Existing One Family Homes Sales Price
Total One Unit Starts
Manufacturer New Orders for Electrical Appliances, Wood Products, and Construction Services
Financial Market Conditions
Mortgage Bankers Association's Weekly Mortgage Application Survey (refinance)
Freddie Mac: Refinance Share of Mortgage Applications
Prime rate
30-year conventional mortgage rate
10 year treasury note
30 year treasury bond
House Price Appreciation and Equity Measures
OFEO Purchase-Only House Price Appreciation Index
Freddie Mac House Price Appreciation Index
Federal Reserve Flow of Funds: Owner's Equity in Real Estate
Macroeconomic and Cyclical Indicators
ECRI Weekly Leading Index
ISM Manufacturer's Survey
Consumer Price Index, Core
Total National Employment
Dow Jones Industrial Average Price at Close

IV. Developing the Leading Indicator: Calculation Methodology

Finalizing Input Variables

The second phase of the project deals with statistical analysis. Once the long list of potential variables was established, a series of tests were undertaken. The inclusion of potential inputs was based on three considerations: economic significance, statistical relationship, and timeliness of the release relative to that of the indicator. When testing statistics variables, there are a few statistical tests that can be utilized. The first and most common is correlation analysis. Correlations allow one to understand how closely the two data series move together. While it does not necessarily reveal the explanatory power of the variable, it does associate the trends of the two series. Thus, it was important to find indicators that led remodeling activity and had high correlations with the indicator.

Upon running correlations, the best were chosen from each category of candidates. In some cases, there were no candidates whose correlation was strong enough, and there were therefore no candidates selected from that category. The variables with the highest concentrations were then tested in a regression analysis context, checking their significance with a t-statistic, as well as their explanatory power on the reference series.

After the testing potential inputs, the final list consists of nine inputs with varying leads (see Table 2).

Table 2: Detail of new variables for inclusion

Data Series	Mnemonic	Source	Data Period	Lead Time *	Definition
Retail Sales	Retail	Department of Commerce	1995Q1-present	1	Retail Sales at Building Materials Stores and Supply Dealers
Shipments of Building Materials	Ship	U.S. Census	1995Q1-present	1	Shipments of Electrical Appliances, Wood Products, and Construction Services
Estimated Residential Improvement	Imp	Department of Commerce	1995Q1-present	0	Trended estimate of current residential improvements spending
Hours Worked by Remodeling Contractors	Hour	Bureau of Labor Statistics	1995Q1-present	2	Weekly hourly average
Pending Home Sales Index	PHSI	National Association of Realtors	2001Q1-present	3	The index is based on pending sales of existing homes, including single-family and condo. A home sale is pending when the contract has been signed but the transaction has not closed.
Remodeling Market Index, Future Expectations	RMI	National Association of Home Builders	2001Q1-present	4	Aggregate of: Backlog of Work, Appointment for Proposals, Calls for Bids, Work scheduled for next 3 months. Index 2002Q1=50
Weekly Leading Index	ECRI	Economic Cycle Research Institute	1995Q1-present	3	Composite index constructed as a weighted average of seven key leading economic indicators. Designed to turn down before a recession and up before an expansion. Index 1992=100
Manufacturing Survey Index	ISM	Institute of Supply Management	1995Q1-present	2	Composite index based on the diffusion index for five indicators; 50+=Economic Expansion
Freddie Mac Cash Out Refinancing Data	Refi	Freddie Mac	1995Q1-present	0	Total Cash-Out Dollars as a Percentage of Aggregate Refinanced Originations

** Refers to lead over C-50 spending in quarters*

This collection of indicators incorporates many different aspects of the economy that influence remodeling activity at different periods of time. Moreover, remodeling specific data series that we were hoping to include, such as the RMI, had very high correlation coefficients, confirming the economic intuition about these variables.

Table 3: Correlation results for final inputs

	Retail	Shipments	Refi	Improvements	Labor	ECRI	ISM	PHSI	RMI
t(4)	.195	.042	.381	.056	.263	.356	.109	.808	**.690**
t(3)	.261	.144	.499	.108	.413	**.421**	.289	**.928**	.602
t(2)	.411	.283	.600	.295	**.445**	.3821	**.416**	.807	.235
t(1)	**.493**	**.331**	.646	.452	.324	.240	.411	.536	(.165)
t(0)	.467	.287	**.649**	**.465**	.101	.079	.298	.087	(.590)

From 1995 Q:1 to 2006 Q:4

Note: The notation t(#) refers to the number of quarters in which the input series leads to reference series. The bold numbers designate the highest correlation.

Calculation Methodology

Upon choosing the final inputs for the model, the next step was the construction of the model specification. A common approach to developing a leading indicator is to use a vector autoregressive model (VAR).[7] However, given the short nature of the time series of some of the input variables, VAR was not an appropriate choice of modeling techniques for this exercise. Instead, the LIRA was computed as a weighted composite of ratios computed from each of the nine input components. The ratios of these inputs are measured as an annual moving four-quarter rate-of-change. Because the raw inputs are measured in different units and therefore not comparable, they were standardized into a four-quarter moving rate of change. Each element was assigned an appropriate weight, and all nine components were integrated into one four-quarter rate of change that constituted the LIRA.

Weighting Methodology

The method attempts to incorporate the inputs' correlation with remodeling expenditures, while continuing to control for the volatility in the components. The components with a stronger

[7] A VAR model is an econometric technique that explains the behavior of a variable through the historical trends of its own lags and also the lags of other variables in the model. Although it has a flexible and theory-free approach, there are also a few shortcomings to the modeling technique that were not ideal for use in the development of the LIRA. For one, all the variables in a VAR model must start at the same time period. Because it was important to include the newer, shorter remodeling-related data series, this limited the time series of data to only a few years, a time period much too short with which to utilize a VAR model correctly. Additionally, most VAR models are estimated using symmetric lags, meaning the same lag length is used for all variables in all equations of the model. Because there were clearly different lag relationships with remodeling activity among the input variables, the use of the VAR model was not appropriate. For a more complete description of VAR modeling techniques and applications, please see: Dua et al. 1999; Moore, Geoffrey 1989 and 1991; and Stock et al. 2001.

correlation with remodeling expenditures therefore have a higher weight in the LIRA estimations. The nine components of the new indicator show a broad range of both correlation to and timing with the C-50 series.

Table 4: Summary of Input Weights

	Improvements	Refi	Retail	Shipments	ISM	Labor	ECRI	PHSI	RMI
	t (0)	t(0)	t (1)	t (1)	t (2)	t (2)	t (3)	t (3)	t (4)
Number of Observations	44	48	48	48	48	48	44	17	17
Average Value	1.06	1.10	1.08	1.03	1.01	.998	1.02	1.04	1.00
Standard Deviation	0.087	0.052	0.031	0.046	0.096	0.009	0.028	0.067	0.083
1/STD	11.55	19.34	32.07	21.59	10.38	113.94	35.88	14.93	12.01
Share of sum of 1/STD	4%	7%	12%	8%	4%	42%	13%	5%	4%
Correlation w/ C-50	0.4646	0.6499	0.4928	0.3305	0.4156	0.445	0.4218	0.928	0.6903
Share of sum of Correlation	10%	13%	10%	7%	9%	9%	9%	19%	14%
Final Weight	**6.93%**	**10.27%**	**10.99%**	**7.39%**	**6.20%**	**25.57%**	**10.96%**	**12.34%**	**9.34%**

The weight for each indicator is calculated using both the correlation and the inverse of the variation for each component. Each component is weighted by the inverse of its standard deviation, and by its correlation with the reference series. The weight can be expressed in terms of:

$$\frac{\sum w_i n_i}{\sum^{n}_{i=1} w_i}$$

where w, refers to the average of the inverse of the standard deviation (1/STD) and the share of the correlation coefficients for each element (n). The function for the indicator can be summarized in the formula:

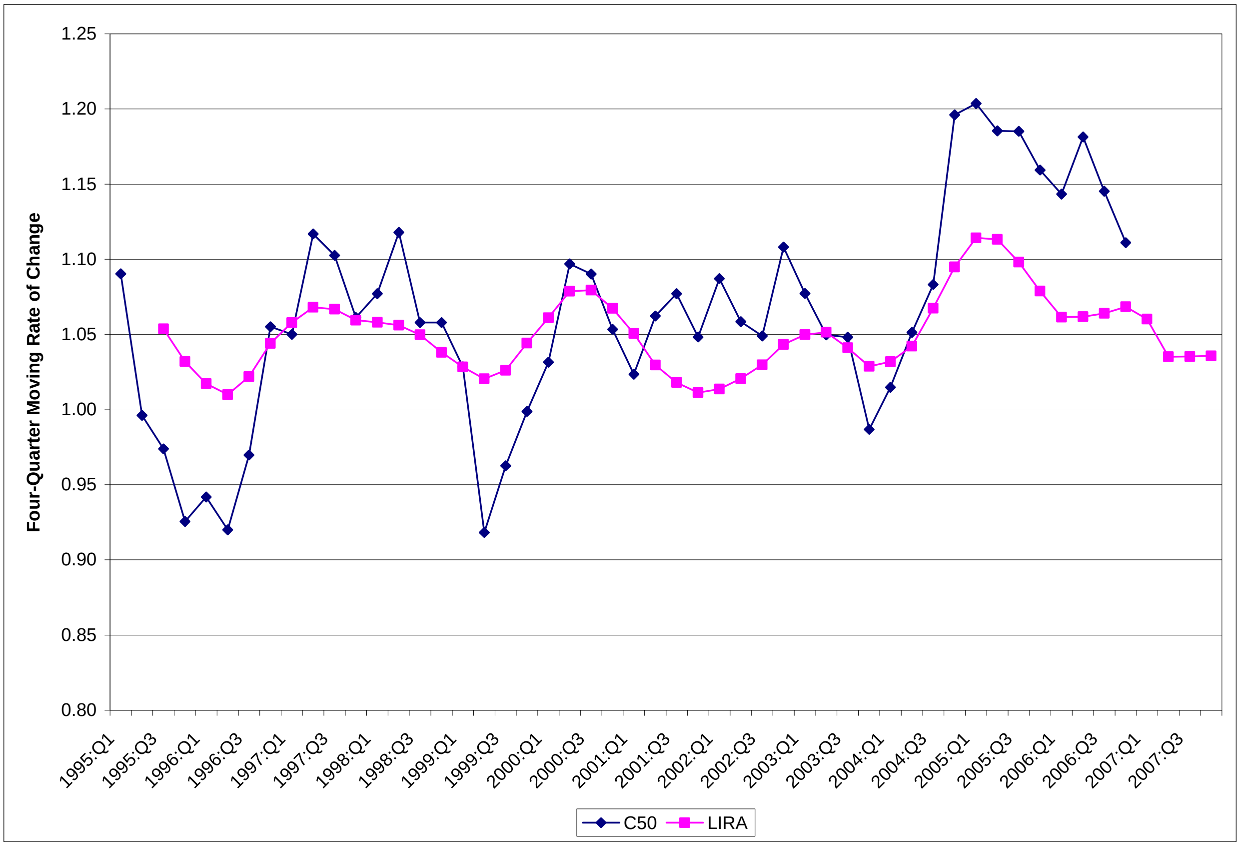
$$(LIRA_{t0}) = \frac{I_{t0}W_{t0I} + R_{t1}W_{t1R} + S_{t1}W_{t1S} + L_{t2}W_{t2L} + E_{t3}W_{t3E} + M_{t3}W_{t3M} + P_{t3}P_{t3H} + N_{t3}W_{t3\ N} + C_{t0}W_{t3\ 0}}{\Sigma W_{IRSLEMPNC}}$$

where I= improvement estimates; R= retail sales at building material and supply stores; S=shipments of building materials; L=average hours worked weekly; E=ECRI's weekly leading index; M=ISM's Manufacturing Index; P=pending home sales; N=remodeling market index; and C=cashout measure.

Final Results and Performance of the LIRA

The LIRA was tested from the first quarter of 1995 through the fourth quarter of 2006. This is the time period in which the LIRA's calculation included the most input variables[8] and had a long enough series to make statistically significant conclusions about its performance. As shown in Figure 2, the LIRA shows a strong relationship with historical homeowner improvement spending.

Figure 2: Final LIRA and C-50



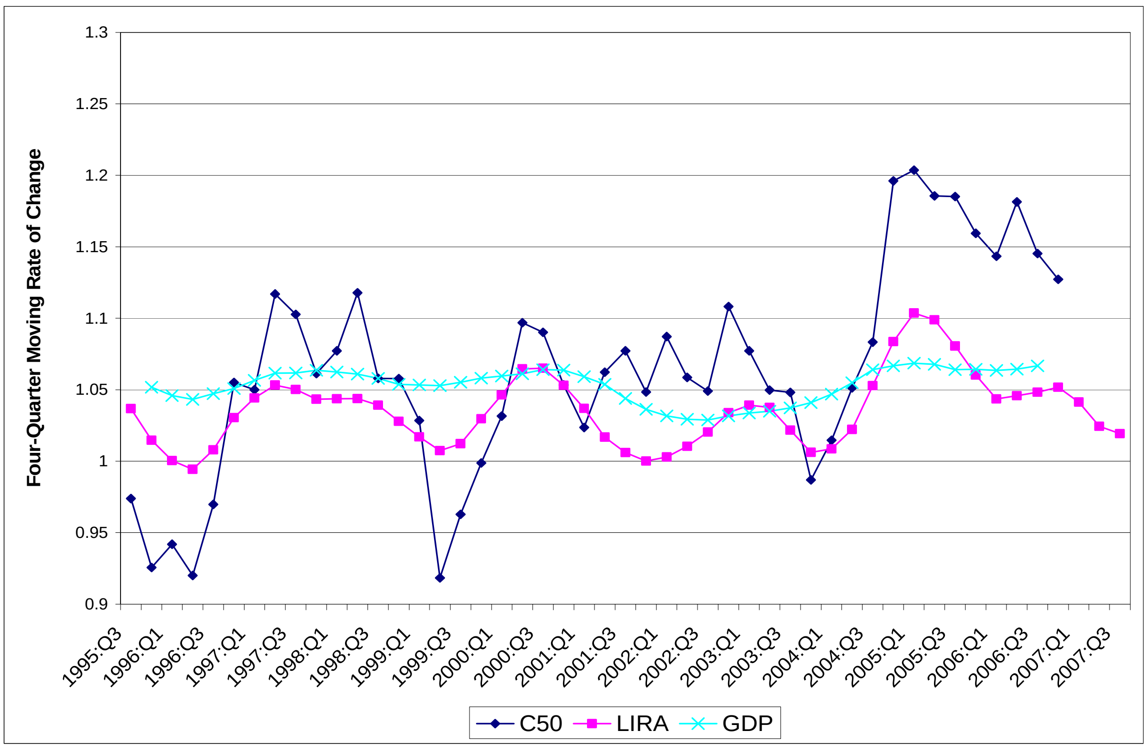
During this entire reference period, the correlation of the LIRA with the C-50 is 0.876, suggesting that these nine elements can explain almost 77% of the variation in the reference series (r_2=0.76.7). While the LIRA still exhibits a cyclical pattern, it does have a smoother and less volatile nature than the C-50 series. The standard deviation of the LIRA series over the entire reference series is 0.025, versus a standard deviation of 0.075 for the C-50 series. Over

[8] Two of the time series, PHSI and RMI, did not begin until 2001, and were therefore not included in the LIRA calculation from 1995-2000. The weights for the LIRA before 2001 were restructured accordingly.

the reference period, the average growth rate of the LIRA is 4.98 percent, while the average growth rate of the C-50 series is 6.44 percent.

Of course, the LIRA's main objective is to anticipate turning points in the cycles of home improvement spending. As seen in Figure 2, the LIRA demonstrates similar cyclicality to the C-50 series, albeit without as much volatility. During the time period between the third quarter of 1995 and the end of 2006, expenditures in remodeling reached four cyclical high points; the LIRA anticipated three of the four. Moreover, during this period, remodeling expenditures had four cyclical low points; in all four cases, the LIRA anticipated these contractions.

Figure 3: Final LIRA, Remodeling Expenditure, and GDP



The one point in which the LIRA diverges significantly from the C-50 series occurs during the 2001-2002 time period. As a point of reference, Figure 3 plots remodeling expenditures along with the two reference series. The period from 2001 to 2002 was an exceptional time in which the remodeling industry held strong despite a recession in the economy. Because of historically low interest rates and unusually high levels of home price appreciation, the remodeling and new construction industries held strong even though GDP dipped.

As with any new research endeavor, the progression of the LIRA will be carefully monitored. As time passes and more data points are added to the series, more robust statistical tests can be performed. Moreover, future economic upturns and downtowns will allow for further testing of the performance of the LIRA at various points in economic cycles. If need be, minor revisions will be made to the LIRA as a result of new information.

V. Conclusion

The Leading Remodeling Activity Indicator (LIRA) was developed as a measure of near-term activity in the home remodeling industry. As the first of its kind, its intended purpose is to predict household remodeling spending with a three-quarter horizon. Like any leading indicator, the LIRA's main objective is to anticipate turning points in the industry cycle.

Development of the LIRA took place in two main phases. The first phase consisted of developing a theoretical framework for the indicator and a list of potential candidates for inclusion in the indicator. Candidates were chosen from a broad range of areas that are believed to impact home remodeling activity, including consumer sentiment, general construction and housing-related indicators, and macroeconomic variables.

The second part of the development of the leading indicator was a statistical exercise. Potential candidates were tested using correlation analysis, and the best series in each broad category was chosen. The inputs were then weighted using their relevance to the reference series and their standard deviation. Finally, these inputs were consolidated into a comprehensive growth rate measuring remodeling activity.

The final result is an indicator that does a good job of tracking remodeling activity. The final LIRA has a cyclical nature which coincides well with cycles in the C-50 data. More importantly, the historical series anticipates turning points in this data series well. While the LIRA maintains the same patterns as the reference series, it has a smoother pattern, dulling some of the apparently random volatility that appears in the reference series.

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Appendix 1: Raw Data to Final Input Variables (4-quarter moving rates of change)

	Improvements	Refi	Retail	Shipments	ISM Manu	Labor	ECRI WLI	PHSI	RMI
	t (0)	t(0)	t (1)	t (1)	t (2)	t (2)	t (3)	t (3)	t (4)
1995:Q1	1.0756	1.093032	1.1258	1.0938	1.0798	1.002557	1.0054		
1995:Q2	1.0195	1.095964	1.1014	1.0565	0.9963	0.99272	1.0087		
1995:Q3	0.9611	1.088249	1.0685	1.0336	0.9187	0.989057	1.0205		
1995:Q4	0.9242	1.079741	1.0451	1.0127	0.8539	0.985841	1.0340		
1996:Q1	0.9199	1.070246	1.028	0.9940	0.8245	0.986046	1.0406		
1996:Q2	0.9622	1.071033	1.0378	1.0137	0.8744	0.993711	1.0430		
1996:Q3	1.0732	1.079798	1.0578	1.0212	0.9266	0.996008	1.0400		
1996:Q4	1.1851	1.085852	1.0682	1.0350	1.0149	0.997204	1.0397		
1997:Q1	1.2309	1.093938	1.0794	1.0595	1.0993	0.999282	1.0372		
1997:Q2	1.1942	1.098834	1.0831	1.0552	1.1069	1.000561	1.0458		
1997:Q3	1.0874	1.094036	1.0795	1.0572	1.1227	1.005254	1.0502		
1997:Q4	1.0106	1.089515	1.0784	1.0619	1.0993	1.009058	1.0480		
1998:Q1	0.9959	1.080123	1.0738	1.0612	1.0570	1.005639	1.0532		
1998:Q2	1.0136	1.070184	1.0646	1.0628	1.0141	0.996215	1.0361		
1998:Q3	1.0244	1.065644	1.0586	1.0568	0.9536	0.987069	1.0197		
1998:Q4	0.9964	1.061664	1.0622	1.0427	0.9044	0.982219	1.0097		
1999:Q1	0.9535	1.066617	1.0707	1.0314	0.8983	0.982877	0.9992		
1999:Q2	0.9264	1.0719	1.0806	1.0283	0.9314	0.992841	1.0060		
1999:Q3	0.9796	1.083584	1.0894	1.0289	0.9930	1.000573	1.0213		
1999:Q4	1.0956	1.094113	1.092	1.0332	1.0835	1.0047	1.0351		
2000:Q1	1.1948	1.103156	1.0951	1.0463	1.1167	1.009822	1.0362		
2000:Q2	1.2632	1.110538	1.0884	1.0423	1.0967	1.009019	1.0335		
2000:Q3	1.2065	1.113892	1.0731	1.0309	1.0476	1.010557	1.0184		
2000:Q4	1.1019	1.117471	1.0521	1.0113	0.9545	1.013236	0.9934		
2001:Q1	1.0199	1.110487	1.0278	0.9659	0.8739	1.014094	0.9806		
2001:Q2	0.9654	1.105354	1.0257	0.9424	0.8326	1.013351	0.9632		

	Improvements	Refi	Retail	Shipments	ISM Manu	Labor	ECRI WLI	PHSI	RMI
	t (0)	t(0)	t (1)	t (1)	t (2)	t (2)	t (3)	t (3)	t (4)
2001:Q3	0.9743	1.099334	1.0314	0.9376	0.8315	1.010316	0.9553		
2001:Q4	0.9956	1.089735	1.0465	0.9461	0.8575	1.010292	0.9678		
2002:Q1	1.0214	1.094108	1.0563	0.9704	0.9736	1.007978	0.9785		
2002:Q2	1.0633	1.096904	1.0534	0.9869	1.0888	1.004926	0.9895		
2002:Q3	1.0934	1.087966	1.0551	0.9957	1.1287	1.000025	0.9982		
2002:Q4	1.1299	1.084107	1.0497	1.0060	1.1790	0.985464	0.9890	1.012013	0.955576
2003:Q1	1.1641	1.0763	1.0459	1.0080	1.0916	0.973381	0.9863	1.002307	0.939824
2003:Q2	1.1586	1.063581	1.0409	1.0074	0.9940	0.971228	1.0088	1.018203	0.983711
2003:Q3	1.1155	1.063406	1.0501	1.0226	0.9928	0.976058	1.0414	1.023201	0.993409
2003:Q4	1.0582	1.075541	1.0682	1.0378	1.0153	0.992576	1.0814	1.046611	1.068212
2004:Q1	1.0206	1.081113	1.07	1.0640	1.0977	1.009608	1.1053	1.090896	1.173587
2004:Q2	0.9873	1.09093	1.1358	1.1051	1.2037	1.017477	1.0899	1.11029	1.16574
2004:Q3	0.999	1.116536	1.1416	1.1196	1.2113	1.017262	1.0603	1.120318	1.107337
2004:Q4	1.0374	1.127699	1.1368	1.1125	1.1357	1.005603	1.0323	1.126746	1.043642
2005:Q1	1.0863	1.149889	1.1212	1.0998	1.0410	0.996718	1.0131	1.106763	0.9609
2005:Q2	1.1435	1.178088	1.0991	1.0652	0.9434	0.989284	1.0175	1.087943	0.956825
2005:Q3	1.1662	1.188736	1.092	1.0377	0.9108	0.986099	1.0241	1.068462	0.972132
2005:Q4	1.153	1.215664	1.1005	1.0343	0.9252	0.993101	1.0270	1.038335	0.96115
2006:Q1	1.0761	1.245047	1.1223	1.0284	0.9501	0.993754	1.0338	1.011931	0.957201
2006:Q2	1.033	1.272755	1.1258	1.0196	0.9993	1.001351	1.0255	0.966152	0.90994
2006:Q3	1.0317	1.298647	1.1152	1.003112	1.0042	1.012615	1.0235	0.917075	0.87923
2006:Q4	1.0961132	1.3032234	1.097301	0.96496	0.9773	1.020823		0.904342	