Ellwood Approach: Applied to the Subprime Residential Market

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Abstract

The Ellwood appraisal method is applied to the residential subprime lending market. Loan-to-value ratios and income levels have a significant and direct influence on existing housing prices. As the level of subprime lending increases housing price movements simultaneously seem to rise. Location is an important factor to consider when determining property values. A regional factor was included in the analysis as a proxy for location.

Key Words: Ellwood Approach, Mortgage-Equity Capitalization, Subprime Lending

Introduction

The Ellwood method also known as the mortgage-equity capitalization approach is used to appraise commercial properties. The mortgage-equity capitalization method as the name suggests explicitly considers financing to be a major factor when determining a property's value. This method is used to appraise real estate investments which are highly leveraged, but this method can be used for unleveraged properties as well. A paper discussing income-appraisal models, and which present value model is best to use uder certain situations was published in 1991. The Ellwood approach was one of the methods listed (Kane, 1991). This method calculates the value of a property on the basis of an available loan-to-value ratio (LTV) which is added to the present value of the expected income stream. The model is specified as:

Value = Loan/Value + present value of income over a specified time period.

Published papers have utilized this approach when estimating the value of equity interest given leverage (Ollman and Traham, 1991), and when estimating the loss of value associated with contaminated properties (Jackson, 1998). Other articles have considered default risk and the lack of liquidity associated with owner-financed residential mortgages (Finch and Rudolph, 1993). Another possible application of the Ellwood model is to the residential real estate market. It can be used to explain price movements of existing single-family houses. Our paper seeks to answer

the question: Do substantial increases in the loan/value (LTV) ratio, and relative median income levels translated into higher residential prices? The mortgage-equity approach suggests that whenever indebtedness levels rise, then the appraised value of the subject property should respond by increasing in value.

Subprime Market

Loans are classified as prime or subprime. Subprime loans when originated have an interest rate that is 3 percent above a contemporaneous long-term, time-matched Treasury security.
A 30-year mortgage would be matched with a Treasury note with a matched maturity date. The use of subprime refinance lending varies by location. In 2005 the city of San Francisco, California reported a 5.16 percent rate while Brownsville, Texas had a subprime refinance rate of 57.3 percent. The market share of subprime loans has grown from $35 billion in 1994 to $665 billion in 2005. Subprime lending has grown rapidly, and in the year 2005 was 20 percent of the conventional mortgage market. The subprime refinancing share of the market when examined on a State basis during the year 2005 had a median level of 26.6 percent. Oregon reported the lowest level at 17.8 percent and Mississippi reported the highest rate at 51.8 percent.

Subprime loans are characterized by high LTV ratios and low down payments. Many of these loans are adjustable rate mortgages with low introductory rates and prepayment penalties. These loans are commonly listed as 2/28. The loan has an introductory interest rate that is below the market rate, and is fixed for two years; and then the loan becomes an adjustable rate mortgage (ARM) for 28 years. Interest rates on the ARM may adjust ever 6 months or once per year. Interest rates risk is passed from the lender to the borrower.

Many borrowers in this market provide limited income documentation and have blemished credit. The refinance market is characterized by high LTV ratios. Borrowers typically remove equity from the property being refinanced for the purpose of consolidating debt or to reduce other credit obligations. Households participating in the subprime refinancing market generally have low

credit scores. Participants are rated at an “A” level or lower and have credit scores below 680. Low personal credit scores are associated with increased default risk, lack of liquidity and wealth constraints.

Regions

There is no national standard for specifying regions or even which States fall within a given region. The United States is composed of many regions, and there is no official designation for a particular State. States located along the Atlantic Ocean are generally grouped in a consistent manner.

The regional divisions used by the National Association of Realtors specify 4 regions. They are the: Northeast, Midwest, South and West. Alaska and Hawaii are classified as located in the West. Other maps include 5 distinct regions. There are 9 regions according to the U. S. Census Bureau: New England, Mid-Atlantic, South Atlantic, East South Central, East North Central, West North Central, West South Central, Mountain and Pacific which includes Alaska and Hawaii. The website Geography.about publishes an e-map of the contiguous 48 states. There are 22 regions shown on this map, and many of the regions overlap with others. Even the language used to describe different regions varies from user to user. Terms like the Great Plains, Rocky Mountain States, Southwest and Great Basin are some of the descriptive terms used to describe regional areas.

Natural waterways and geographic characteristics form the basis for the regional assignment shown in Table 1. Hawaii and Alaska are not included in the west. They are considered a separate area referred to as Outside of the continental United States. Eleven regions are specified for the purpose of analyzing the impact of location on decision-making behavior. States are assigned to the regional categories: Northeast, Mid-Atlantic, Southeast, South Central, Gulf, Desert, Great Lakes, Midwest, Mountain, Pacific and Outside the United States. Table 1 shows which States are assigned to a particular Region.

Table 1: Regional Classification

Variable Dummy	States	Percentage Subprime Loans
Region 1	**Northeast:** CT, MA, ME, NH, RI, VT	26.05%
Region 2	**Mid-Atlantic:** DE, MD, NJ, NY PA	24.7%
Region 3	**Southeast:** FL, GA, NC, SC, VA	29%
Region 4	**South Central:** AR, KY, TN, WV	36.15%
Region 5	**Gulf**: LA, AL, MS	41.6%
Region 6	**Desert:** AZ, NM, OK, TX	36.25%
Region 7	**Great Lakes:** IL, IN, MI, OH, WI	35.8%
Region 8	**Midwest:** IA, KS, MN, MO, ND, SD, NE	36.6%
Region 9	**Mountain:** CO, ID, MT, NV, UT, WY	23.15%
Region 10	**Pacific:** CA, OR, WA	17.8%
Region 11	**Outside:** AK, HI	27.6%

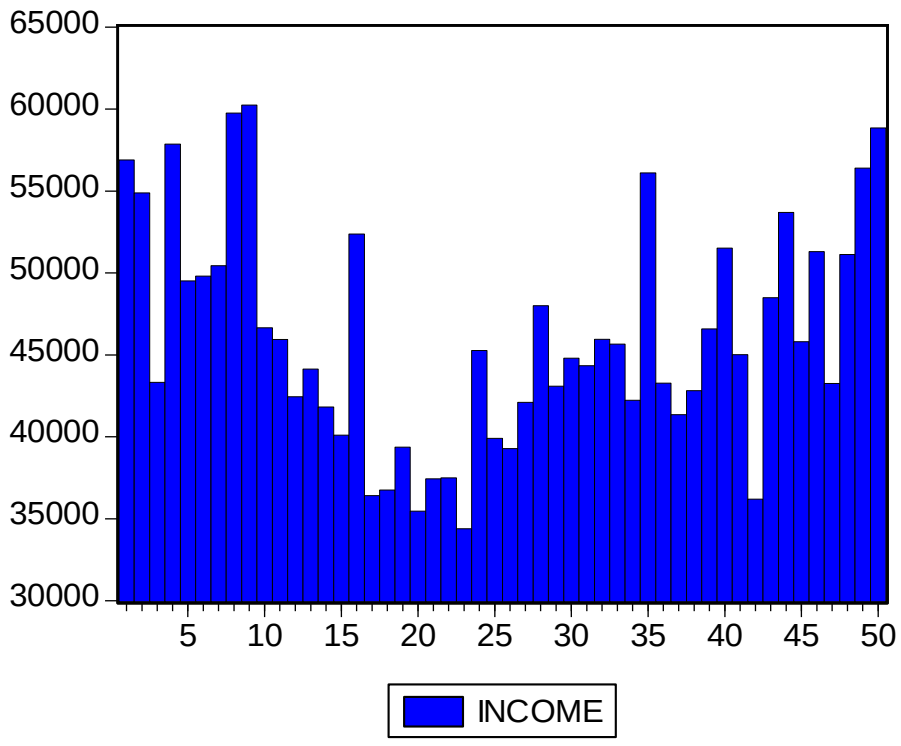
Median Income and Housing Price Index

Median income is published by the U.S. Census Bureau in 2 and 3 year cycles. The two-year cycle was used in this paper. The median income for 2004-2005 ranged from a low of $34,396 (Mississippi) to a high of $60,246 (New Jersey). The price-adjusted median income for the United States during 2004-2005 was $46,071, and was $45,893 during 2003-2004. When comparing income changes by State the income trend was more complicated. Some States experience net losses in income in 2005 dollars while others experience net gains. Median income changes ranged from <5.6> percent to 5.5 percent. There were 24 States with negative median income changes and 26 States registering positive percentage changes. Graph 1 shows State median income. The far left on the graph shows information from Regions 1 and 2 and

Regions 10 and 11 are located on the far right. States are listed in regional groups in the order shown on Table 1.

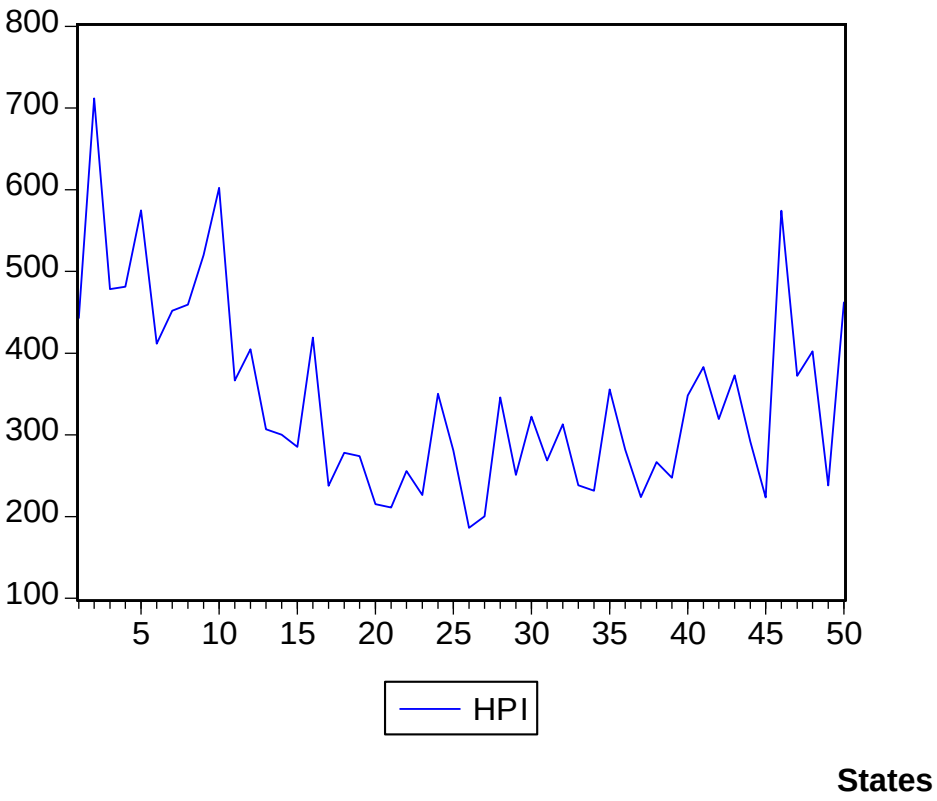
A working paper written by Ira Goldstein which was published by The Joint Center for Housing Studies (2004) found that the market penetration of subprime mortgages is greater in low and moderate income area. Our study used median income to measure variations in moderate household earning power between States. Graphs 1 and 2 indicate that regions located along from the Atlantic and Pacific coasts generally have higher incomes and higher housing prices than those in the interior of the country.

Graph 1: State Median Income
(by regional membership)



The Housing Price Index (HPI) is published by the Office of Federal Housing Enterprise Oversight. Index numbers are used to gauge existing housing prices by State over time. The Average HPI during 2005 ranged from 186.323 (Oklahoma) compared to 602.458 (New York). Percentage changes in the HPI over 1 and 5 year periods prior to 2005 were positive for all States. Over a single year the appreciation rates ranged from 3.76 percent (Michigan) to 19.99 percent (Virginia). Graph 2 charts Average HPI per State.

Graph 2: State Average Housing Price Index
(by regional membership)



Results

The cross-section study used information from all 50 States, and the data was drawn from the calendar year 2005. Results shown on Table 2 indicate that a direct linkage exists between

Median Income and existing housing prices. Income and Subprime refinance lending levels are significant variables. They move directly with trends in the Average Housing Price Index. States with higher incomes demand more housing, and this causes higher average residential prices. The subprime refinance variable has a positive coefficient sign which indicates that when this lending market is healthy, then the average price of housing is higher. The converse also holds. Weakness in the subprime market would impact existing housing prices adversely. Tightening underwriting standards applied to subprime loan applications, or legislatively lowering allowable LTV ratios could result in declining residential property values for some categories of single-family housing.

Table 2: Regression Results

Dependent Variable: Average HPI
Method: Least Squares
Independent Variables: Median Income, Regions, Subprime Refinance Lending
Sample: 50 states, Year 2005
$y = c + b_1x_1 + b_2x_2 + b_3x_3 + e_i$
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-54.41511	67.72413	-0.803482	0.4258
Median Income	0.010228	0.001606	6.367521	0.0000
Regions	-16.14533	4.378619	-3.687312	0.0006
Subprime	0.001147	0.000585	1.959467	0.0561

R-squared	0.631723	Mean dependent var	343.3427
Adjusted R-squared	0.607705	S.D. dependent var	118.0252
S.E. of regression	73.92325	Akaike info criterion	11.52055
Sum squared resid	251373.8	Schwarz criterion	11.67351
Log likelihood	-284.0138	F-statistic	26.30203
Durbin-Watson stat	2.396091	Probability (F-statistic)	0.000000

The location variable called Regions is significant. Real estate is very dependent on location. The variables Median Income, Subprime and Regions explain 63 percent of the movements in the Average Housing Price Index variable.

Concluding Remarks

Housing prices increased in all States during 2005, and during prior 1 and 5 year periods. The highest 5 year change in the Housing Price Index was 117.29 (California). Increasing prices over an extended period of time may condition households to expect that continuing price increases will occur uninterrupted into the future. The financial decisions to refinance a house using a high LTV ratio seems less risky when a household is conditioned to believe that property value appreciation is an ongoing event.

There are several factors that encourage households to participation in the subprime market. First, the equity withdrawn when refinancing occurs is expected to be recouped through a combination of future loan amortization and property appreciation. Second, whenever housing prices appreciate on a continuous basis, then households with a marginal ability to participate begin to think that homeownership opportunities are slipping away from them. Third, borrowers in this market often have blemished credit, and have experienced difficulties paying bills in the past. There is little wealth to lose or documented income to attach should they become delinquent. These circumstances encourage participation in the subprime market even when presented with expensive loans options. The above logic encourages households to participate in the subprime market, and might spur rapid growth in this type of borrowing.

An abrupt tightening of underwriting standards by either reducing allowable LTV ratios or tightening underwriting standards would result in lower demand. Fewer households participating in the subprime market would adversely impact some housing prices. Houses financed with high LTV ratios would potentially be worth less than the loan collateralizing them. Resale opportunities are limited when appraised value is less than the loan balance, and may result in more residential property foreclosures.

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