

**MORTGAGE INSURANCE AND REAL ESTATE RETURNS:
A NORTH AMERICAN PERSPECTIVE**

by

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Abstract

This article explains the link between mortgages insured by government agencies and the underlying house price, in both Canada and the United States of America (USA). Overall, American states with fewer insured mortgages relative to all mortgages originated experience a larger real estate price decline during an economic downturn despite a lower concentration of risky consumers in those areas.

Canadian mortgage insurance data is virtually unavailable although over 50 percent of all residential mortgages are insured in Canada. Canadian insurance data, provided by the Canadian Mortgage and Housing Corporation (CMHC), is sparse and does not allow for as in-depth of an analysis of mortgage insurance in the Canadian market versus that of the USA.

Proposed regulations will make mortgage insurance harder to obtain and may actually strengthen the Canadian real estate market. Unfortunately, the CMHC has refused to release valuable mortgage insurance data and a thorough analysis cannot be conducted.

Keywords: real estate market, home price, mortgage insurance, Canadian Mortgage and Housing Corporation (CMHC), Federal Housing Administration (FHA), Farm Service Agency (FSA), Rural Housing Service (RHS), Veterans Affairs (VA).

Executive Summary

As the turmoil of the financial crisis begins to dissipate, the effects of mortgage insurance on the real estate market and the greater economy have come under increased scrutiny by the government, academics, and the general public alike. Mortgage loan insurance is an insurance policy that compensates the lender or investors for losses in the event of a default on a mortgage loan. Policy holders typically pay a premium as a percentage of the total loan value and this premium is normally added to the principal of the loan, effectively leading to a small premium with each mortgage payment over the amortization period. Consumers obtain the insurance under regulation or use it to qualify for mortgages at interest rates comparable to those offered to buyers with larger down payments. For millions of North Americans, this type of insurance is an important consideration that will effect their decision to buy a home.

In Canada, consumers interested in purchasing a home with a high ratio loan, that is a loan-to-value ratio less than 80%, must obtain mortgage insurance by federal law. Most individuals obtain insurance from the Canadian Mortgage and Housing Corporation (CMHC) which is a crown corporation of the Government of Canada and is the country's national housing agency. The CMHC contributes to the stability of the housing market and financial systems, provides support to Canadians in housing need, and offers objective housing research and advice to Canadian governments, consumers and the housing industry.

In the United States, there are four government entities that back mortgage loans for individuals wishing to buy a home with a high-ratio mortgage: Federal Housing

Administration (FHA); Farm Service Agency (FSA); Rural Housing Service (RHS); and Veterans Affairs (VA). FHA-insured loans are considered a type of federal assistance and have historically allowed low-income Americans to borrow money for the purchase of a home that they would not otherwise be able to afford.

After identifying the amount of loans that are insured for various American states, the ratio of mortgage insurance had a moderate effect on the decrease in home prices during the period between 2007 and 2011. American states with fewer government-backed insured mortgages relative to all mortgages underwritten saw larger price declines when compared to areas with high volumes of insured mortgage loans. Areas with lower volumes of insured loans encompass individuals who are less risky but experience a higher level of real estate price volatility.

Although the Canadian market shares some similarities to the American market, Canada's availability and transparency of mortgage loan information pales in comparison. In America, the *Home Mortgage Disclosure Act of 1975* (HMDA) is a federal law that requires certain financial institutions to provide mortgage data to the public. As such, a number of details on millions of mortgages are made available each year. In Canada, there is a similar act that is broader in nature because it relates to the transparency of all government entities. *The Access to Information Act of 1985* states that public information should be made available to the public with limited and specific exemptions and decisions on whether to disclose government information should be made independently of government. Even though the CMHC is bound by the *Access to Information Act*, they're representatives refuse to make important mortgage information available to the public.

Dedication

To Lesia. Without you, none of this would be possible.

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1: Literature Review

Researchers explore the link between lending and asset markets under the assumption that asset-backed loans are mispriced, either rationally or irrationally. In the last decade, research has identified the impact of aggressive lending on real estate. Pavlov and Wachter (2004) found that underpricing of the default risk in bank lending leads to inflated asset prices in markets of fixed supply. Hung and Tu (2006) found that the increase in the median home price in California is associated with the increased use of adjustable rate mortgages (ARMs). The International Monetary Fund (IMF 2004, p. 81) also suggested that countries with higher use of ARMs have a more volatile real estate market. Himmelberg, Mayer and Sinai (2005) identify real estate price inflation by comparing the theoretically estimated price to the observed market price. Pavlov and Wachter (2011) distinguish themselves from Himmelberg, Mayer and Sinai's argument by developing an observable implication and mechanism for a specific cause of asset price changes and potentially, a credit-induced bubble. They found both theoretically and empirically, that the presence of aggressive lending instrument magnifies real estate market cycles. Specifically, markets with high concentrations of aggressive lending instruments are at risk of relatively larger price declines following a negative demand shock. In addition, Pavlov and Wachter (2011) found that markets with the most decline following a negative demand shock tend to suffer greater withdrawal of aggressive lending.

According to Herzog (2009), rising housing demand during the early 1900's made way for the development of a number of private mortgage insurance companies. Today almost all of them have gone bankrupt or ceased writing new policies, highlighting an ongoing concern within the American housing market. The *National Housing Act* of 1934 created the Federal Housing Administration (FHA), which was established primarily to increase home construction, reduce unemployment, and operate various loan insurance programs (www.fha.gov).

There are four government-entity loan insurance programs currently in existence: the Federal Housing Administration (FHA)-insured; the Farm Service Agency (FSA)-guaranteed; the Rural Housing Service (RHS)-guaranteed; the Veterans Affairs (VA)-guaranteed. Typically, borrowers who utilize this type of insurance make less than a 20% down-payment and typically pay a premium either upfront, or it is amortized into the total amount of the loan.

Since mortgage insurance reduces the risk to the lender, borrowers may qualify for mortgages with interest rates comparable to those offered with larger down payments, therefore making mortgage insurance attractive to the consumer. Deng and Gabriel (2005) analyze the competing risks of FHA mortgage termination, specifically, the release of collateral when a mortgage is paid in full. They found that elevated default risks of loans originated among lower credit quality and minority borrowers are more than offset by the damped prepayment speeds of those loans, so as to result in markedly lower termination probabilities amongst underserved borrowers. In addition, they also found that pooling and risk-based pricing of FHA-insured mortgages can substantially reduce housing finance costs among underserved borrowers, which advances their home

ownership opportunities. At the same time, Pavlov and Wachter (2011) found that when some borrowers see their borrowing constraint relaxed, asset prices increase; if loans are underpriced, this effect is magnified.

2: Data & Analysis

2.1 Data

2.1.1 USA

This empirical analysis uses state-level insured share of total mortgage originations from the *Home Mortgage Disclosure Act* (HMDA). For the purposes of this research, all types of insured or guaranteed mortgages were considered. Annual data from 2006 & 2007 was used as a proxy for the period precluding the financial crisis and any loan data missing a geographical location was removed from the data set, accounting for a loss of 1,437,368 mortgage originations or 3.27% of the total loan volume. In total, 43,997,265 mortgage originations from 2006 and 2007 with a total value of \$8,497,053,695,000 USD were used to determine the state-level insured mortgage ratios.

Home price data was downloaded from the Federal Housing Finance Agency (FHFA) website (www.fhfa.gov) for 50 states, the District of Columbia, and Puerto Rico. Home Price Index (HPI) data is a weighted, repeat-sales index and it measures average price changes in repeat sales or refinancing of the same properties.

American state-level Gross Domestic Product (GDP) and personal income data was downloaded from the Bureau of Economic Analysis (bea.gov). GDP and personal income data for Puerto Rico was obtained from the World Bank database (www.data.worldbank.org/country/puerto-rico). This analysis utilized per capita real GDP total percent increase/decrease as a control measure for the regression analysis. It also utilized per capita income total percent increase/decrease as a robustness measure for the regression analysis.

2.1.2 Canada

Home price data was downloaded from the Teranet and National Bank of Canada's website (www.housepriceindex.ca). The Teranet-National Bank House Price Index (TNBHPI) is an independent representation of the rate of change of Canadian single-family home prices based on the property records of public land registries. The TNBHPI covers eleven Canadian metropolitan areas including Victoria, Vancouver, Calgary, Edmonton, Winnipeg, Hamilton, Toronto, Ottawa, Montréal, Québec and Halifax.

Historical information for the total value of insured mortgages in Canada was downloaded from Statistics Canada's website (www.statscan.gc.ca, CANSIM Table 176-0014).

The CMHC currently has very little data available by province and almost no data is available by specific geographical regions as it pertains to mortgage loan insurance information. They provide a number of statistics with regards to housing starts, completions and rental data, however, mortgage loan insurance information is sparse. The only relevant source of mortgage loan insurance information can be found within the Mortgage Loan Insurance Business Supplement. There are several issues with this document: first, the report was only initiated in three years ago and as a result records only go as far back as 2013, and it is limited in its analysis of longitudinal economic trends. Key data metrics are missing and those that are available are only provided on a national level, for example, loan-to-value ratios are not broken down into provincial segments, and the entire report's most refined geographical area is at the provincial level. This document does not disclose the loan volume amounts as an exact number, but only as a rough estimate. In essence, the only corporation to provide mandatory insurance for

consumers with less than a 20% initial deposit does not disclose how much business is done in each region of Canada.

With this in mind, Robyn Adamache, a Market Analyst at the CMHC Vancouver office, was first contacted and an information request was made for a more refined loan insurance data set of the British Columbia market. The request was denied. Richard Cho, a Market Analyst at the CMHC Calgary office, was then contacted with the same request for Alberta. The request was denied. As an entity of the government, the CMHC is bound by The Access of Information Act (1985). According to the *Access to Information Act*, information should be made available to the public with limited and specific exemptions and decisions on whether to disclose government information should be made independently of government. Both representative refused to provide information and they repeatedly refused any compromise with regards to the geographical refinement of the data. As such, Angèle Legault, the Access to Information and Privacy Officer at the CMHC, was contacted and a formal request was submitted under the *Access to Information Act*. The request was redirected to David D'Amour, Director of Q.A. and Business Analytics at the Office of the Senior Vice-President for Insurance, and the request was denied. According to David, "The CMHC is unable to accommodate the request. (The) CMHC is in the process of considering what additional information can and should be provided to the public as part of our planning and prioritizing for 2017."

2.2 Methodology

This research closely follows that of Pavlov and Wachter (2011) and their work on Subprime Lending and Real Estate Prices.

2.2.1 USA

Mortgage insurance information was obtained from HMDA and the total insured mortgage ratio for each state were determined as a percent dollar volume of insured mortgage loans compared to all mortgages originated in that state (Table 1). Ratios were determined for each state and average insured ratios were calculated by averaging values from 2006 and 2007. FHA-insured, FSA-guaranteed, RHS-guaranteed and VA-guaranteed were all considered insured mortgages.

Quarterly HPI data was obtained from FHFA and the total percent return from 2007 – 2011 was used. This timeframe represents the beginning of the housing decline during the financial crisis to the bottom of the national housing market (Figure 1). During this period, the value of the US housing market dropped by almost 13% on average. Additionally, total percent return from 2011 – 2015 was used to represent the upturn as the US housing market rose on average by 15.5% during this period (Table 2).

The Insured Mortgage Ratios and Total Percentage Decreases were analyzed using a cross-sectional regression for each timeframe. In addition, per capita GDP was introduced into the regression analysis as a control variable and per capita personal income was used to analyze robustness.

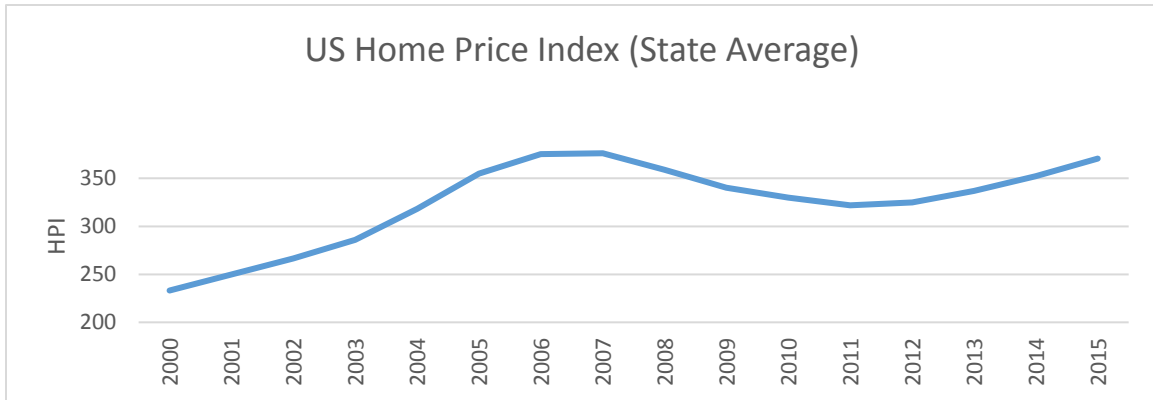


Figure 1 HPI of American States from 2000 – 2015 (Source: Federal Housing Finance Agency)

2.2.2 Canada

HPI data was collected from Teranet-National Bank House Price Index and a total percent return for the period from 2000 to 2015 was calculated (Figure 2).

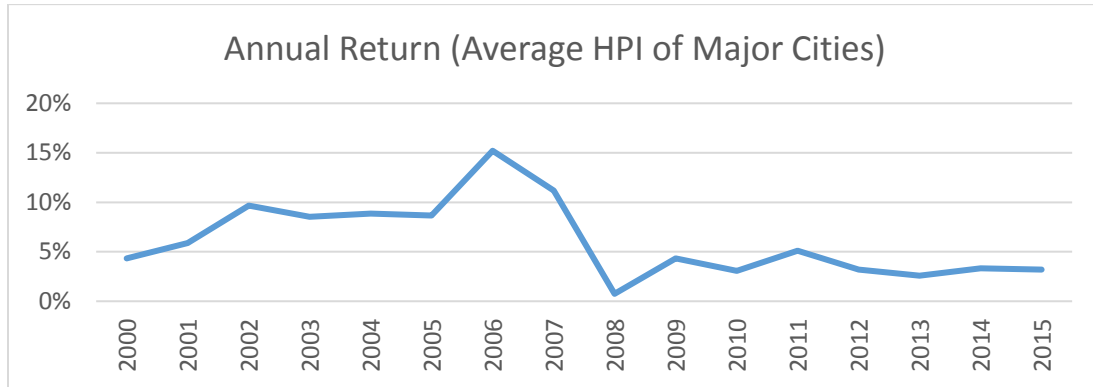


Figure 2 Total Annual Return of Major City (Source: Teranet-National Bank House Price Index)

Since provincial mortgage loan insurance data could not be obtained from the CMHC, even though a formal request was submitted under the *Access to Information Act*, mortgage insurance ratios for Canadian regions could not be calculated.

Nationally, the mortgage insurance ratio is substantially higher in Canada when compared to America, hovering just above 50% of all residential mortgages (Figure 3). In addition, there was a sharp increase in the national insurance rate in 2010 to 2012 from 43% to 60% respectively. From 2012 onward, there is a decreasing trend that could be amplified by new mortgage insurance regulations in 2016.

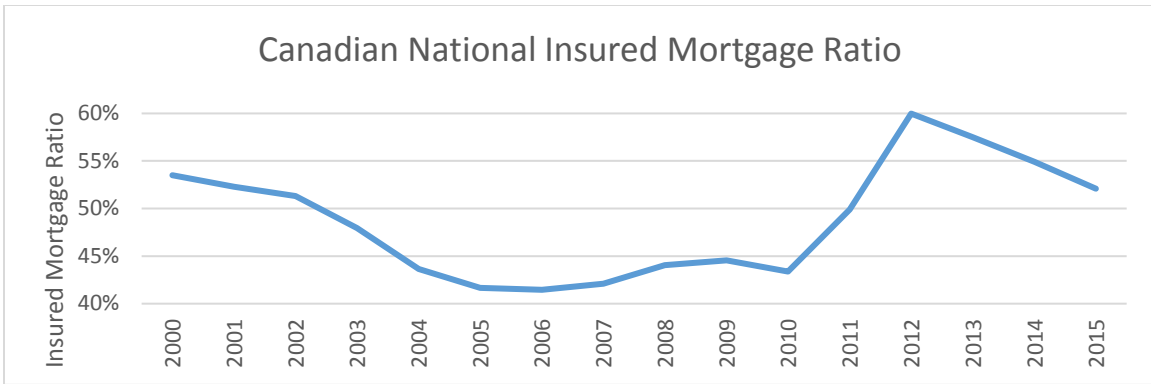


Figure 3 Canadian National Insured Mortgage Ratio for Residential Mortgages (Source: Statistics Canada, CANSIM Table 176-0014)

2.3 Results

2.3.1 USA

After analysing the insured mortgage ratio and total percent decline from 2007 to 2011, an apparent trend emerged. States on the east and west coast had a significantly lower amount of insured mortgages relative to all mortgages underwritten (Figure 7). In addition, states with fewer insured mortgage loans relative to all mortgages underwritten experienced larger negative decreases during the recession (Figure 4). This suggests that mortgage insurance plays a stabilizing effect on the real estate market. For example, Nevada had fewer than 4% of total mortgages insured and experienced nearly a 48% decrease whereas Alaska had almost 18% of total mortgages insured and experienced less than a 1% decrease during the same timeframe. From the regression analysis (Table 3) a moderate positive correlation is evident between the insured mortgage ratio and the total percent return.

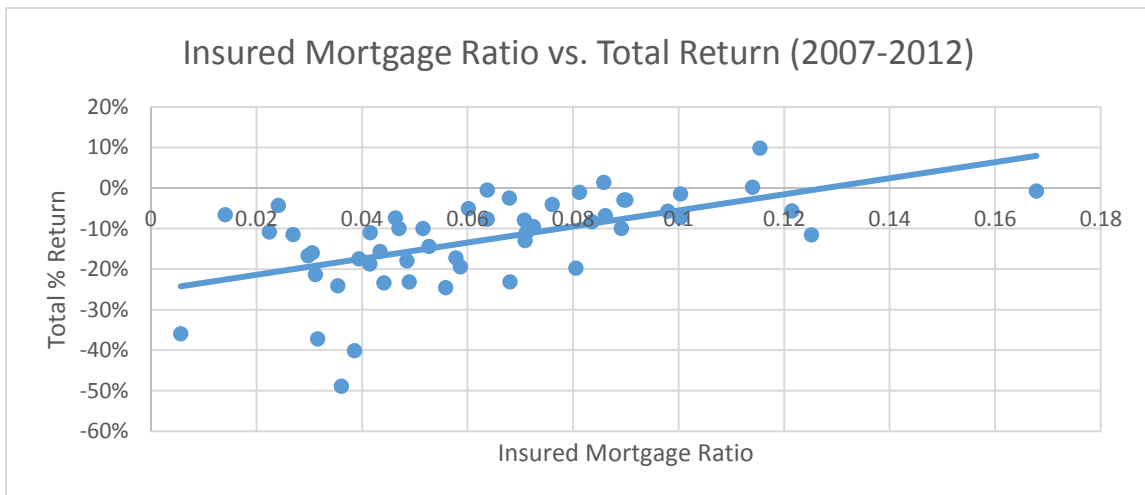
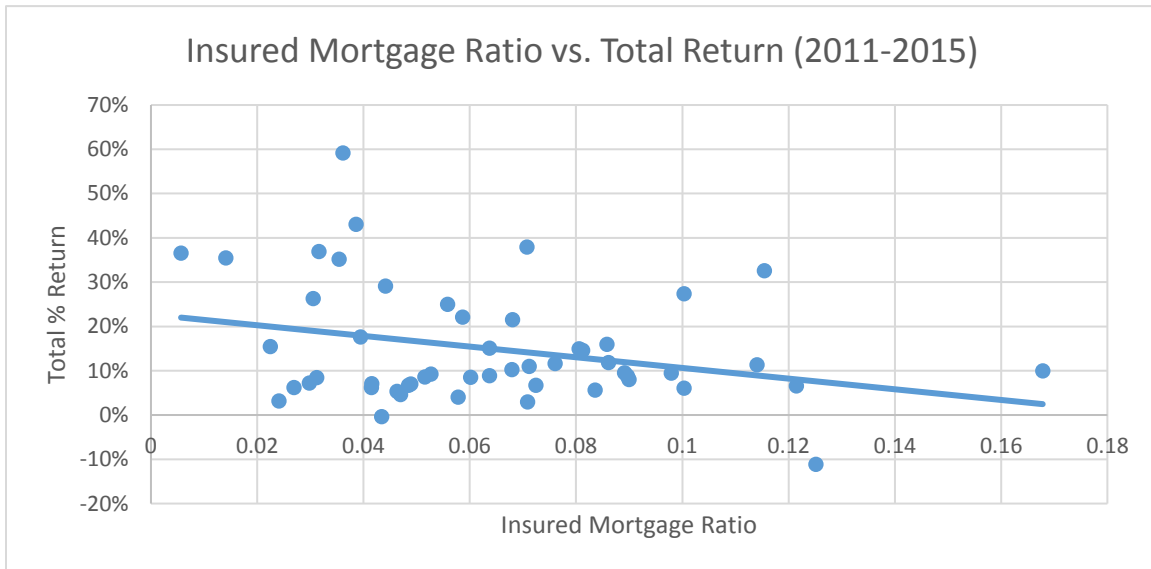


Figure 4 Insured Mortgage Ratio vs. Total % Return from 2007 to 2012

The correlation coefficient value of 0.5677 highlights the strength of the relationship; about 32% of the variation in home price return can be explained by the

mortgage insurance ratio. The insured mortgage ratio is significant as an explanatory variable with a p-value of 0. In addition, the regression outputs with GDP & personal income per capita confirms the results (Table 4 & 5).

Figure 5 Insured Mortgage Ratio vs. Total % Return from 2012 to 2015



After analyzing the insured mortgage ratio and total return during the housing upturn, it seems that states with a lower insured mortgage ratio experience a higher return during the upswing whereas states with higher insured mortgage ratios saw a lower relative return highlighting the stabilizing effect of mortgage insurance (Figure 5). For example, Nevada has an insured mortgage ratio of less than 4% though they experienced almost a 60% increase. At the same time, Alaska had the highest insured mortgage ratio at almost 17% but only saw an increase of 10% during the same period. States with lower insured mortgage ratios seem to have a larger volatility when compared to areas with higher insured mortgage ratios: however, the effect is not as strong when compared to the patterns in the economic downturn between 2007 and 2011.

From the regression analysis (Table 6) a weak to moderate correlation is evident between the insured mortgage ratio and the total percent return during the economic upturn between 2011 and 2015. The correlation coefficient value of 0.2951 highlights the weak-strength of the relationship with about only 9% of the variation in home price return being explained by the mortgage insurance ratio. The insured mortgage ratio can be considered significant as an explanatory variable with a p-value of 0.03. In addition, the regression outputs with GDP & personal income per capita confirms the results (Table 7 & 8).

2.3.2 Canada

When comparing the total annual return of both the American and Canadian markets from 2000 to 2015, a moderate pattern appears.

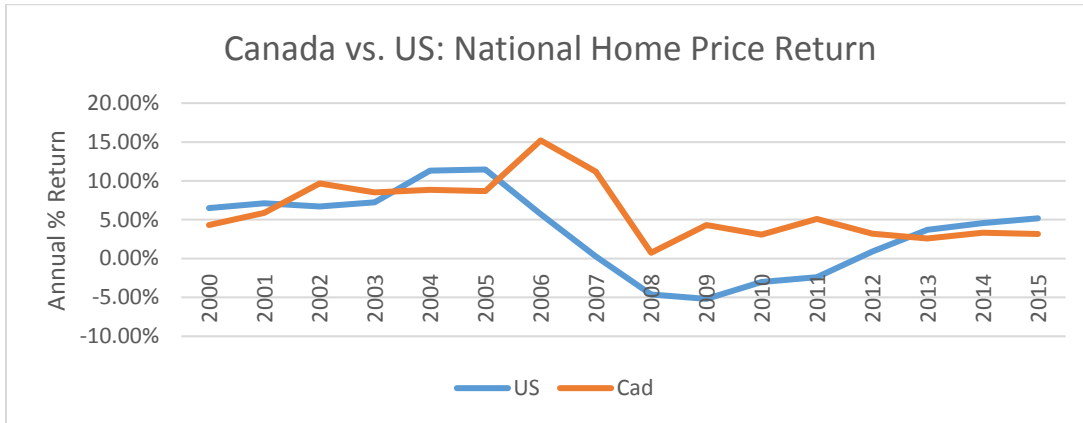


Figure 6 Total % Return of Canada and US HPI (Sources: Teranet-Nation Bank HPI & FHSA HPI)

With a correlation of 0.5, it is no surprise that the two markets share some similarities, though there are several important differences (Figure 6). The Canadian real estate market has been viewed as the model for the G7 countries during the financial crisis as Canadian banks were able to weather the storm that brought down several large financial institutions around the globe. Even though the necessary data is not available to conduct a thorough analysis, effects similar to the American real estate market may be present in Canada especially if specific areas experience a decrease in total insured loan volume.

3: Conclusion

3.1 Implication for the USA

This article demonstrates how the absence of mortgage insurance magnifies real estate market cycles in America. States with low concentration of mortgage insurance are at risk of relatively larger price declines following a negative demand shock. This finding is consistent with the prevalence of aggressive instruments and deregulation that enables the relaxation of the borrowing constraint and in turn magnifies the effects of negative demand shocks. Furthermore, markets with the lowest concentration of insured mortgage loans experienced the largest declines.

Since mortgage insurance acts as a real estate market cycle stabilizer, the latest increase in insured mortgages underwritten could signal a stronger and more stable real estate market in America.

3.2 Final Remarks and Implications for Canada

The Canadian Real Estate Market has proved its relative strength during the recent financial crisis when compared America, however, the availability of mortgage insurance data is somewhat lacking in Canada.

The Canadian Mortgage and Housing Corporation (CMHC) is Canada's National housing agency and they help millions of Canadians meet their housing needs by offering mortgage loan insurance with a minimum down payment that can be as low as 5% (www.cmhc-schl.gc.ca).

Although over \$540,000,000 in loan volume was insured in 2015, the CMHC only provides national data on key metrics and have refused to provide more information by province or major city. A request under the Access of Information Act was submitted and denied by three separate departments. As an entity of the government, the CMHC is bound by the *Access to Information Act*, though, their representatives were unwilling to release this type of information.

New mortgage insurance rules take effect in 2016 as high ratio loans submitted for mortgage insurance must be qualified using the Mortgage Rate Stress Test, and the CMHC has new eligibility requirements for low ratio loans. Both these measures stand to decrease the total amount of loans underwritten and may actually amplify the effects of a negative demand shock in specific Canadian regions.

3.3 Research Limitations

The absence of mortgage insurance information currently available in Canada makes it impossible to perform any meaningful regression analysis. Although the CMHC was contacted several times and an access to information request was processed, ultimately no data was provided.

The Canadian market is much smaller than our American neighbours and current home price indices do not cover all transactions across all regional areas. Only transactions from major city centres are included and this is used as a proxy for the entire province. This lack of availability sharply contrasts the American market where transaction data from all regions is readily available online and specific transaction data can be obtained at a cost.

In both the American and Canadian markets, information on homes purchased with cash is extremely hard to obtain. In Canada, fears about inflated markets in Vancouver and Toronto are amplified with the influx of international investment. Even though recent regulation has attempted to dampen the negative effects of foreign investment on the housing market, future impacts may still emerge.

Even though the American real estate market is similar to the Canadian market, there are some distinct differences. Not only are there more private mortgage insurers in America but American citizens can also deduct interest expense on their mortgage payment even if it is their primary residence. In Canada, however, individuals cannot deduct mortgage interest expense on their primary home and can only do so with additional investment properties.

3.4 Future Research

In America there is ample information available on every mortgage originated. The public has access to data including nationality, race and after tax income just to name a few. All of these aspects can and should be studied further to identify possible impacts on home prices. Also, the geographical differences between counties and states can be looked into more rigorously to discover any patterns or asset price implications.

Although an access to information request was denied by the CMHC, there are two additional mortgage insurers in Canada who deal primarily with the secondary market. Genworth Canada and Canada Guaranty may be more willing to provide necessary information to the Canadian public and should be contacted for further research. Additionally, as time passes more historic information will be available from the CMHC's Mortgage Insurance Business Supplement report and this will open the door to additional research. Unfortunately, waiting years for more information to become available is not ideal.

Appendix A: Regression Data

Table 1 Insured Mortgage Ratio by State (Source: HMDA)

State Abbreviation	State Name	Insured Mortgage Ratio
AK	Alaska	16.78%
AL	Alabama	8.36%
AR	Arkansas	12.15%
AZ	Arizona	3.86%
CA	California	0.57%
CO	Colorado	7.08%
CT	Connecticut	4.34%
DC	District of Columbia	1.41%
DE	Delaware	5.78%
FL	Florida	3.16%
GA	Georgia	8.05%
HI	Hawaii	3.06%
IA	Iowa	6.37%
ID	Idaho	5.59%
IL	Illinois	4.15%
IN	Indiana	9.79%
KS	Kansas	9.00%
KY	Kentucky	8.97%
LA	Louisiana	6.79%
MA	Massachusetts	2.24%
MD	Maryland	4.89%
ME	Maine	4.16%
MI	Michigan	6.80%
MN	Minnesota	3.94%
MO	Missouri	7.25%
MS	Mississippi	10.03%
MT	Montana	6.37%
NC	North Carolina	7.12%
ND	North Dakota	11.54%
NE	Nebraska	8.12%
NH	New Hampshire	2.98%
NJ	New Jersey	4.85%
NM	New Mexico	7.09%
NV	Nevada	3.61%
NY	New York	2.69%
OH	Ohio	8.91%

OK	Oklahoma	11.40%
OR	Oregon	3.54%
PA	Pennsylvania	4.63%
PR	Puerto Rico	12.52%
RI	Rhode Island	3.12%
SC	South Carolina	5.15%
SD	South Dakota	8.58%
TN	Tennessee	8.61%
TX	Texas	10.03%
UT	Utah	5.87%
VA	Virginia	5.27%
VT	Vermont	2.41%
WA	Washington	4.41%
WI	Wisconsin	4.70%
WV	West Virginia	6.02%
WY	Wyoming	7.61%

Table 2 Total % Return, 2007-12 & 2012-15 (Source: Federal Housing Finance Agency)

Region	2007-2011 HPI Total Return	2011-2015 HPI Total Return
Alaska	-0.72%	9.93%
Alabama	-8.32%	5.56%
Arkansas	-5.64%	6.56%
Arizona	-40.09%	43.01%
California	-35.91%	36.49%
Colorado	-7.97%	37.91%
Connecticut	-15.69%	-0.38%
District of Columbia	-6.58%	35.43%
Delaware	-17.23%	4.02%
Florida	-37.22%	36.91%
Georgia	-19.73%	14.92%
Hawaii	-16.01%	26.29%
Iowa	-0.50%	8.83%
Idaho	-24.55%	24.98%
Illinois	-18.71%	6.18%
Indiana	-5.70%	9.41%
Kansas	-2.98%	8.01%
Kentucky	-2.97%	8.76%
Louisiana	-2.51%	10.22%

Massachusetts	-10.89%	15.42%
Maryland	-23.13%	6.99%
Maine	-11.00%	7.06%
Michigan	-23.12%	21.47%
Minnesota	-17.50%	17.57%
Missouri	-9.52%	6.67%
Mississippi	-7.31%	6.00%
Montana	-7.68%	15.04%
North Carolina	-11.01%	10.91%
North Dakota	9.80%	32.55%
Nebraska	-1.03%	14.53%
New Hampshire	-16.66%	7.19%
New Jersey	-17.95%	6.70%
New Mexico	-12.98%	2.94%
Nevada	-48.88%	59.11%
New York	-11.49%	6.19%
Ohio	-10.00%	9.48%
Oklahoma	0.16%	11.31%
Oregon	-24.10%	35.12%
Pennsylvania	-7.38%	5.33%
Puerto Rico	-11.55%	-11.17%
Rhode Island	-21.35%	8.38%
South Carolina	-9.96%	8.54%
South Dakota	1.35%	15.93%
Tennessee	-6.86%	11.79%
Texas	-1.43%	27.32%
Utah	-19.48%	22.06%
Virginia	-14.40%	9.19%
Vermont	-4.32%	3.17%
Washington	-23.36%	29.05%
Wisconsin	-9.95%	4.58%
West Virginia	-5.08%	8.51%
Wyoming	-4.03%	11.59%

Table 3 Regression Output: Insured Mortgage Ratio vs. Total Return during Downturn (2007-2011)

<i>Regression Statistics</i>						
Multiple R	0.5677					
R Square	0.3223					
Adjusted R Square	0.3088					
Standard Error	0.0930					
Observations	52					

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	0.2055	0.2055	23.7807	0.0000	
Residual	50	0.4321	0.0086			
Total	51	0.6376				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	(0.25)	0.03	(8.75)	0.00	(0.31)	(0.20)
Insured Mortgage Ratio	1.98	0.41	4.88	0.00	1.17	2.80

Table 4 Regression Output: Insured Mortgage Ratio & Per Capita GDP vs. Total Return during Downturn (2007-2011)

<i>Regression Statistics</i>						
Multiple R	0.7628					
R Square	0.5818					
Adjusted R Square	0.5648					
Standard Error	0.0738					
Observations	52					

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	0.3710	0.1855	34.0878	0.0000	
Residual	49	0.2666	0.0054			
Total	51	0.6376				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	(0.27)	0.02	(11.72)	0.00	(0.32)	(0.23)
Insured Mortgage Ratio	1.11	0.36	3.10	0.00	0.39	1.84
GDP per Capita	0.79	0.14	5.51	0.00	0.50	1.07

Table 5 Regression Output: Insured Mortgage Ratio & Per Capita Income vs. Total Return during Downturn (2007-2011)

<i>Regression Statistics</i>						
Multiple R		0.2972				
R Square		0.0883				
Adjusted R Square		0.0511				
Standard Error		0.1273				
Observations		52				

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	0.0769	0.0384	2.3735	0.1038	
Residual	49	0.7937	0.0162			
Total	51	0.8706				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.22	0.04	5.00	0.00	0.13	0.31
Insured Mortgage Ratio	(1.29)	0.64	(2.01)	0.05	(2.58)	0.00
Per Capita Income	0.09	0.34	0.26	0.80	(0.59)	0.76

Table 6 Regression Output: Insured Mortgage Ratio vs. Total Return during Upturn (2011-2015)

<i>Regression Statistics</i>						
Multiple R		0.2951				
R Square		0.0871				
Adjusted R Square		0.0688				
Standard Error		0.1261				
Observations		52				

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	0.0758	0.0758	4.7697	0.0337	
Residual	50	0.7948	0.0159			
Total	51	0.8706				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.23	0.04	5.77	0.00	0.15	0.31
Insured Mortgage Ratio	(1.20)	0.55	(2.18)	0.03	(2.31)	(0.10)

Table 7 Regression Output: Insured Mortgage Ratio & Per Capita GDP vs. Total Return during Upturn (2011-2015)

<i>Regression Statistics</i>						
Multiple R	0.3975					
R Square	0.1580					
Adjusted R Square	0.1236					
Standard Error	0.1223					
Observations	52					

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	0.1375	0.0688	4.5965	0.0148	
Residual	49	0.7331	0.0150			
Total	51	0.8706				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.13	0.06	2.15	0.04	0.01	0.25
Insured Mortgage Ratio	(0.86)	0.56	(1.53)	0.13	(1.99)	0.27
GDP per Capita	0.57	0.28	2.03	0.05	0.01	1.13

Table 8 Regression Output: Insured Mortgage Ratio & Per Capita Income vs. Total Return during Upturn (2011-2015)

<i>Regression Statistics</i>						
Multiple R	0.5718					
R Square	0.3270					
Adjusted R Square	0.2995					
Standard Error	0.0936					
Observations	52					

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	2	0.2085	0.1042	11.9015	0.0001	
Residual	49	0.4291	0.0088			
Total	51	0.6376				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	(0.23)	0.06	(4.08)	0.00	(0.34)	(0.11)
Insured Mortgage Ratio	1.96	0.41	4.76	0.00	1.13	2.79
Per Capita Income	(0.17)	0.29	(0.58)	0.56	(0.74)	0.41

Appendix B: Geographical Data

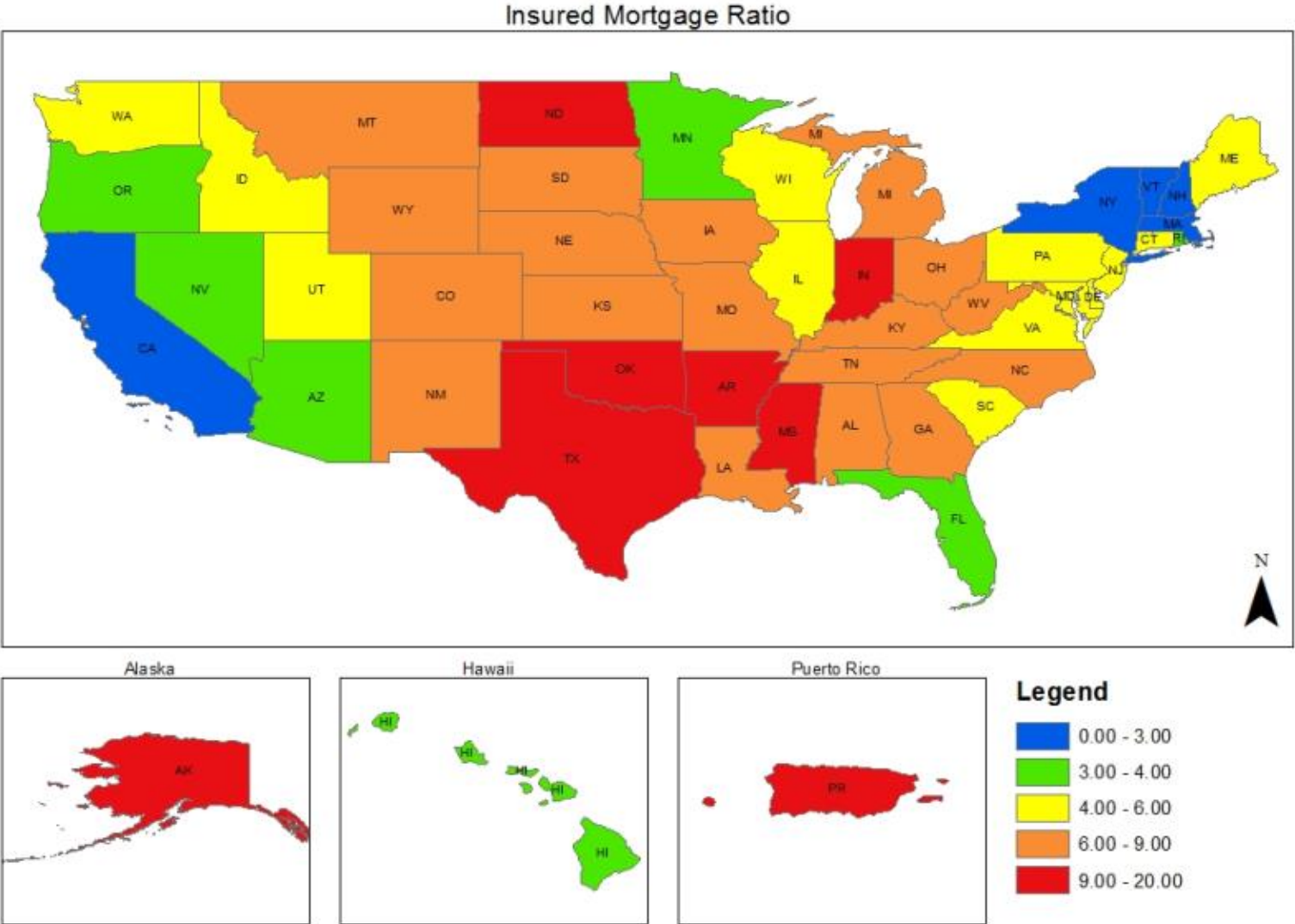


Figure 7 Insured Mortgage Ratio by State (Source: HMDA)

2007 - 2011 HPI Total Return

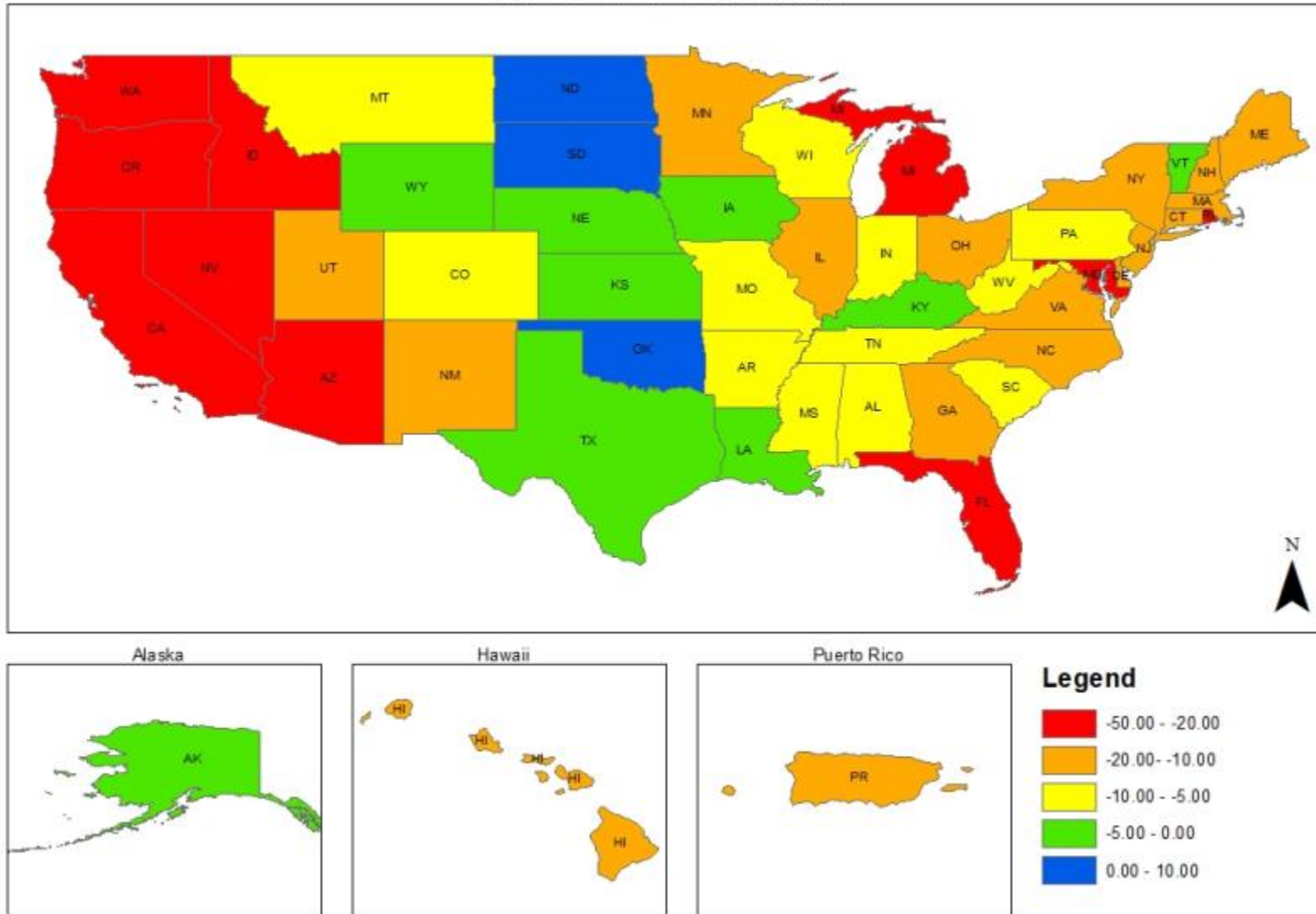


Figure 8 2007-2011 HPI Total % Return

2011 - 2015 HPI Total Return

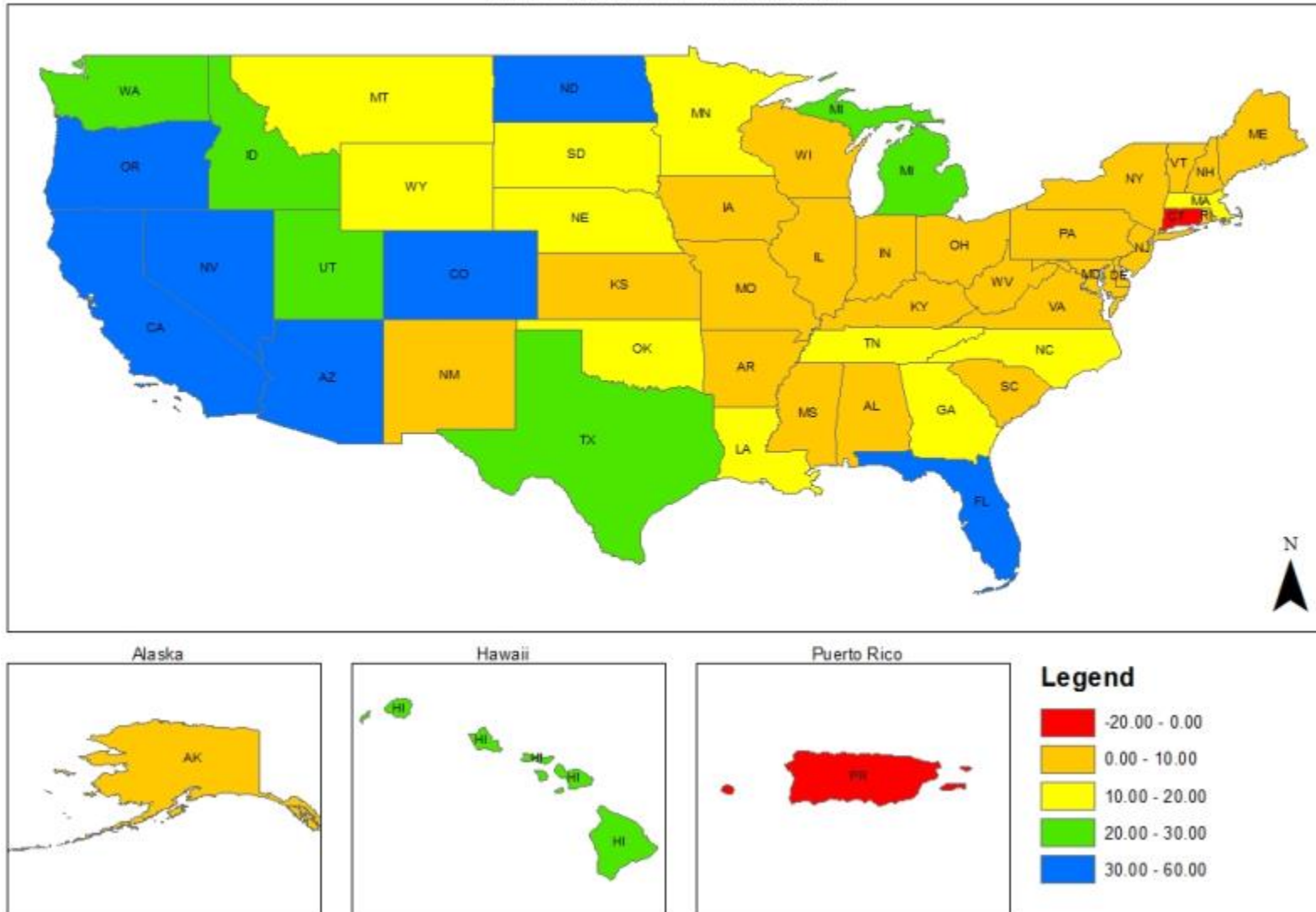


Figure 9 2011-2015 HPI Total % Return

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