MISSOURI RESIDENTIAL

EARTHQUAKE COVERAGE 2019

STATISTICS SECTION • JULY 2019

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Introduction

Missouri is the third largest market for earthquake insurance among the states, exceeded only by California and Washington.[1] The primary earthquake risk in the state is associated with the New Madrid fault, and is greatest in the Southeast quadrant of the state extending from the bootheel northwards to St. Louis and beyond. However, it is precisely in this high-risk area that the market for earthquake insurance has significantly contracted over the past 20 years – many insurers have left the market entirely, while others refuse to issue new policies in the New Madrid area. Among insurers still willing to sell coverage, stricter underwriting standards make some types of dwellings ineligible for coverage. Those who can obtain coverage find that they are required to "self-insure" to a much greater extent than in the past. Deductibles up to 20 percent of the dwelling value are not uncommon, and "stacked" deductibles are often applied separately to the dwelling and contents. While coverage has contracted, the price of coverage has increased significantly, in some instances by more than 500 percent in some counties over the last 15 years. In short, coverage has become significantly less available and less affordable in the areas that require it most.

This report presents data on some of the market trends over the past 15 years. Missouri is one of the few states that collect residential insurance data by ZIP code, including data for earthquake coverage. These data afford a fairly precise measure of market penetration and price by geographic region. In addition, these data were supplemented by a survey of Missouri's largest writers regarding market practices related to earthquake coverage.

Summary of Findings

Earthquake coverage has become less available and less affordable over the last 15 to 20 years. Where the coverage is available, prices have significantly increased and consumers are required to self-insure to a greater extent than ever before.

- On average, earthquake premiums in the six counties that comprise the New Madrid area have increased by nearly 700 percent between 2000 and 2018, and in one county by nearly 1,000 percent.

- While rates have increased throughout the state, the rates in the highest risk areas of the data have increased much more rapidly, widening the costs between high and low risk areas. In 2000, average annual premium in the New Madrid area was only 64 percent higher than the lowest risk counties of Missouri. By 2018, premiums were nearly 334 percent higher.

- In 2000, over 60 percent of residences in the New Madrid area had earthquake insurance. By 2018, the rate of coverage had declined to just under 14 percent, a decrease of 46 percentage points.

- In other high risk areas outside of the New Madrid zone, take-up rates also substantially decreased, from 67.6 percent to 46.3 percent over the same period.

[1] Including territories, Puerto Rico also has a somewhat higher premium volume for earthquake insurance. However, Puerto Rico is a special case, in that earthquake insurance is required for most residences.

- Nearly half a million residences that are not covered for earthquake losses are located in a Missouri county rated 7 or higher on the Mercalli scale (a measurement of vulnerability to a New Madrid earthquake, see below). The total property value of these unprotected residences, excluding the value of contents that may also be at risk, is estimated to approach $100 billion.

- Based on the Missouri market share for homeowners insurance,
    - Carriers with 12.5 percent of the home insurance market either write no earthquake coverage anywhere in the state, or only renew existing earthquake policies but won't issue new coverage
    - Significantly more, or 31 percent, write somewhere in Missouri, but will not provide new coverage in the New Madrid area (though some of these still offer renewal coverage)
    - 41 percent issue some new coverage in the New Madrid area, but will not insure some types of construction, such as masonry homes.
    - Only 26.6 percent of the market issues coverage in New Madrid on the same basis as elsewhere in the state, but even these companies may have significant additional underwriting restrictions based on the age and location of the home and other construction characteristics

- Those able to obtain earthquake insurance must still "self-insure" to a significant degree. In the six-county New Madrid area, only one insurer (among those surveyed) offers a deductible of less than 10 percent of the insured value of the residence. Over 27 percent of the market requires a deductible of 15 percent or higher. Often, deductibles are "stacked," such that they apply separately to the building and contents.

- Of those who have earthquake coverage and are located in areas with a risk of 7 or higher on the Mercalli 10-point scale, the amount of risk they still retain due to deductibles exceeds $14.5 billion. When this amount is added to homes that have no earthquake coverage, the value of self-insured residential property in moderate to high-risk zones exceeds $110 billion.

In the following report, these trends are displayed by Missouri region and by county.

Missouri's Earthquake Risk

Over the winter of 1811-1812, the New Madrid area of Missouri experienced a series of powerful earthquakes. By most estimates, these quakes were among the strongest ever experienced on the continental US, at least since settlement by Europeans. According to the US Geological Survey (USGS), the area of strong ground motion exceeded the 1964 Alaska earthquake by a factor of two to three, and was approximately ten times as large as the 1909 San Francisco earthquake. Because of the lack of instrumentation at the time, estimates must be based on written accounts of those who witnessed the quake or its aftermath. The majority of researchers believe the three primary quakes ranged in magnitude from 7.0 to 7.5, with several aftershocks ranging from 6.0 to 6.5 (see USGS,http://earthquake.usgs.gov/earthquakes/states/events/1811-1812.php).

Eyewitness accounts of the event(s) vividly describe the extraordinary violence unleashed by the New Madrid fault. One eyewitness close to the epicenter of the December 11, 2011 earthquake details "…a scene truly horrible:"

On the 16th of December, 1811, about two o'clock, A.M., we were visited by a violent shock of an earthquake, accompanied by a very awful noise resembling loud but distant thunder, but more hoarse and vibrating, which was followed in a few minutes by the complete saturation of the atmosphere, with sulphurious vapor, causing total darkness. The screams of the affrighted inhabitants running to and fro, not knowing where to go, or what to do - the cries of the fowls and beasts of every species - the cracking of trees falling, and the roaring of the Mississippi - the current of which was retrograde for a few minutes, owing as is supposed, to an irruption in its bed -- formed a scene truly horrible.[2]

Strong tremors and some property damage were reported as far away as Cleveland (where a local newspaper reported "serious alarm" at "shocks far more violent than any before experienced"), Alexandria, Pittsburgh, Washington D.C., New York and other eastern cities.

Were an earthquake of similar magnitude to occur today along the New Madrid fault, losses would be staggering. The risk modeling firm AIR Worldwide has estimated that a New Madrid recurrence would produce *insured* losses of $120 billion (2011 dollars). Such losses would only be rivaled by a repeat of the 1906 San Francisco earthquake, with estimated losses of $93 billion.

Estimated Insured Losses Were Event to Happen Today

Date	**Event Location**	**Magnitude**	**Insured Losses (2011 Dollars)**
February 7, 1812	New Madrid, Mo	7.7	$120 billion
April 17, 1906	San Francisco, CA	7.9	$93 billion
August 31, 1886	Charleston, SC	7.3	$44 billion
June 1, 1838	San Francisco, CA	7.4	$30 billion
January 17, 1994	Northridge, CA	6.7	$23 billion
October 21, 1868	Hayward, CA	7.0	$23 billion
January 9, 1857	Fort Tejon, CA	7.9	$8 billion
October 17, 1989	Loma Prieta, CA	6.3	$7 billion
March 10, 1933	Long Beach, CA	6.4	$5 billion
July 1, 1911	Calaveras, CA	6.4	$4 billion

Source: AIR Worldwide. Estimated losses include property and contents loss, additional living expense, business interruption for residential, mobile home, commercial and automobile losses. Estimates include demand surge and fire following earthquake, and are based on earthquake insurance take-up rates in each area. See http://www.air-worldwide.com/Publications/AIR-Currents/2012/Top-10-Historical-Hurricanes-and-Earthquakes-in-the-U-S---What-Would-They-Cost-Today/

[2] Letter from Eliza Bryan, March 22, 1816. Reprinted by USGS, available at http://hsv.com/genlintr/newmadrd/accnt1.htm

The USGS has estimated that the probability of a magnitude 7.5 or greater earthquake in the New Madrid zone over the next 50 years is between 7%-10%. The probability of an earthquake exceeding magnitude 6 over the same time period is 25% - 40%.[3] A joint assessment by the Mid-American Earthquake Center of the University of Illinois and the Federal Emergency Management Agency predicted that a major New Madrid event could entail total economic losses of $300 billion, surpassing the highest total economic loss of any natural disaster in US history. The report is worth quoting at length:

"Nearly 715,000 buildings are damaged in the eight-state study region. About 42,000 search and rescue personnel working in 1,500 teams are required to respond to the earthquakes. Damage to critical infrastructure (essential facilities, transportation and utility lifelines) is substantial in the 140 impacted counties near the rupture zone, including 3,500 damaged bridges and nearly 425,000 breaks and leaks to both local and interstate pipelines. Approximately 2.6 million households are without power after the earthquake. Nearly 86,000 injuries and fatalities result from damage to infrastructure. Nearly 130 hospitals are damaged and most are located in the impacted counties near the rupture zone. There is extensive damage and substantial travel delays in both Memphis Tennessee, and St. Louis, Missouri, thus hampering search and rescue as well as evacuation. Moreover roughly 15 major bridges are unusable. Three days after the earthquake, 7.2 million people are still displaced and 2 million people seek temporary shelter. Direct economic losses for the eight states total nearly $300 billion, while indirect losses may be at least twice this amount."[4]

The Missouri counties most vulnerable to earthquake risk are the six southeastern-most counties in the bootheel: Dunklin, Mississippi, New Madrid, Pemiscot, Scott and Stoddard. Other high risk areas include counties adjacent to the New Madrid Region, extending north to St. Louis. The entire western portion of the state has a relatively lower risk for earthquake damage, a fact important for Missouri earthquake insurance market.

The Mercalli Scale, a measure of shaking intensity ranging from 1 to 12, is depicted in the map on the following page. If a large New Madrid event were to occur today, large portions of the state would be subjected to shaking ranging from 7 to 10 on this scale. The remainder of the state would be subject to shaking intensity rated at a level of 6. The levels are defined by the intensity of ground movement, as follows:

6 – *Strong*. Felt by nearly everyone. Loose objects and some windows may be broken, and unstable objects overturned.

7 – *Very Strong*. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures. Poorly built or badly designed structures will experience considerable damage.

8 – *Severe*. Damage is slight in specially designed structures, but considerable in ordinary substantial buildings which may partially collapse. Damage is great in poorly built structures. Fallen chimneys, factory stacks, columns, and walls will not be uncommon. Heavy furniture may be overturned.

9 – *Violent*. Damage is considerable even in specially designed structures. Well-designed frame structures will be thrown out of alignment. Damage will be great in substantial buildings, with partial collapse. Buildings will be shifted off foundations. Some underground pipes will be broken. Reservoirs suffer severe damage.

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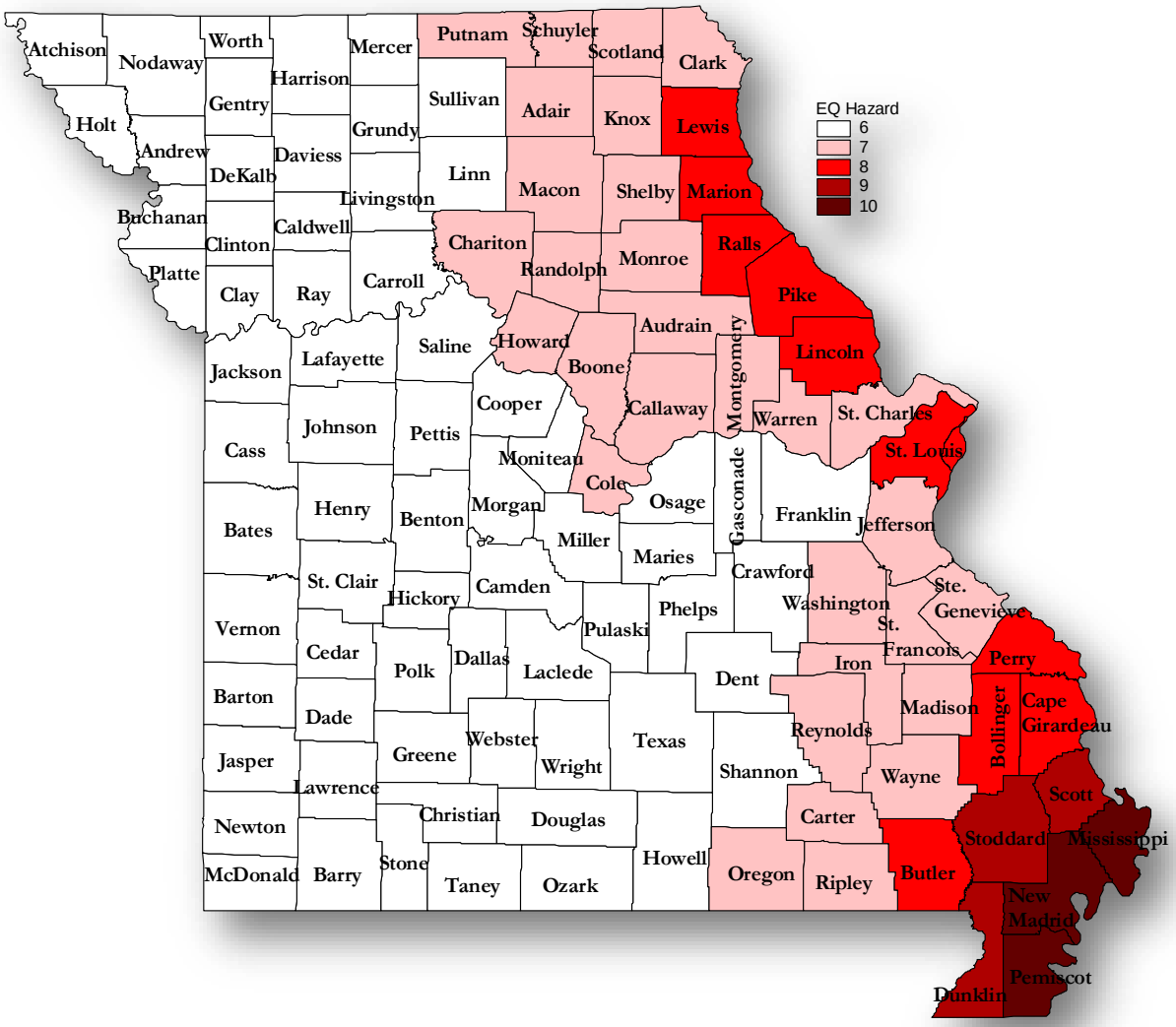
[3] US Geological Survey Fact Sheet FS-131-02. October, 2002.

[4] Elnashai, Amr, Lisa Cleveland, Theresa Jefferson and John Harrald. 2009. Impact of New Madrid Seismic Zone Earthquakes on the Central USA, Vol I & II. MAE Center Report No. 09-03

10 – *Extreme*. Some well-built wooden structures will be totally destroyed. Most masonry and frame structures along with foundations will be destroyed. Bridges and dams may be severely damaged or destroyed. Large landslides will occur, and water thrown from the banks of rivers and lakes.

Mercalli Scale

(Projected Intensity Associated with Possible New Madrid Earthquake)



Source: Adapted from the Missouri State Emergency Management Agency.

Background: Managing Risk with Insurance Markets

Earthquake insurance markets possess features that depart significantly from what might be called "ideal" insurance markets, and such peculiarities are largely attributable to the nature of the underlying risk. In competitive markets, the price of a product reflects the cost of production plus administrative expenses and a normal rate of return (and, of course, elasticity of demand). Unlike traditional and particularly tangible products, the cost of insurance isn't known with certainty at the time the price is established and the product sold. To price in a meaningful way, insurers require a high degree of confidence that predictions regarding likely losses are accurate. The greater the uncertainty regarding the true risk and ultimate payout in claims, the less well a market will function in the traditional sense. Of course, this same uncertainty regarding the true nature of the risk is shared by consumers, potentially creating additional problems on the demand side of the market.

Traditionally, the most predictable and therefore insurable events are those characterized by high frequency and low severity losses. Statistical models rely on the "law of large numbers," such that the more one is able to observe an event over time, the greater the certainty that meaningful probabilities of loss can be ascertained.[5] In addition, risks are manageable because losses of this kind are *statistically independent events.* The probability that Driver B in Kansas City will be involved in an automobile accident on a given day isn't affected by the fact that Driver A in St. Louis experienced a crash. While automobile and homeowners insurance can be subject to catastrophic large-scale losses due to a single event, such losses are manageable and are generally a small proportion of overall losses when extended over a sufficient time period. Most automobile losses, for example, are due to day-to-day crashes whose costs are highly predictable over time, and where loss probabilities aren't subject to significant swings from year-to-year. In general, prior year losses are a very good predictor of current year losses.

Clearly, earthquake insurance markets depart from the idealized features discussed above in several important ways. First, the likelihood of a significant event cannot be determined with a high degree of confidence and precision, certainly not in a way that is analogous to predicting automobile losses. Secondly, rather than "high frequency / low severity" losses, earthquakes present exactly the opposite risk in which losses are very infrequent (in Missouri) but have the potential to be catastrophic. Nor are losses *independent events* – a loss on one policy will quite possibly entail losses of virtually every policy within the area of risk. Lastly, known earthquake risk in Missouri is largely localized to the southeastern quadrant of the state, so there is little incentive for individuals residing outside of the high risk zone to purchase coverage (and in fact few homeowners in low risk areas have earthquake coverage). It is therefore difficult to spread risk geographically using traditional market mechanisms.

Many of these types of events have at various times in history become uninsurable by private markets. Some risks have been assumed by public bodies in whole or in part when private markets failed to produce adequate or affordable coverage. Examples include flood insurance, crop insurance and the terrorism risk backstop, where at various times such risks were considered too unpredictable and possible losses too catastrophic for the private market to insure them via normal market operation. Similarly, after the 1994

[5] The "law of large numbers" explains why predictions about the ratio of heads to tales in a coin flip are much more accurate for 1,000 flips than 10 flips; or why larger sample sizes are more precise (have smaller margins of errors).

Northridge Earthquake, the public California Earthquake Authority was established to stabilize the market, and it currently issues more than three-fourths of all residential earthquake policies in the state.[6]

Alternative Risk Management Mechanisms –Reinsurance

As noted above, primary insurance markets cannot easily accommodate risks when hazards are geographically localized. As discussed further below, few individuals residing outside the area of highest risk are likely to purchase coverage, and they are likely to be much more sensitive to price. An insurer willing to provide earthquake coverage will inevitably experience a degree of "adverse selection," and find that insureds are concentrated where the risk is greatest and minimal where the risk is least.

However, there are alternative market mechanisms available. One such mechanism is *reinsurance* - essentially insurance for insurance companies. Large reinsurers operate on a global scale, and primary insurers can transfer significant portions of the risk associated with a book of business to these entities in exchange for a premium. As might be expected, earthquake coverage is highly reinsured. In 2018, a little over 70 percent of direct earthquake premium was ceded to reinsurance.[7] Other mechanisms include catastrophe bonds, or securities issued by insurers to pass risk on to investors. Total outstanding catastrophe bonds amounted to more than $20 billion in 2015 and cover risks such as hurricanes and earthquakes.[8]

Reinsurance markets work well to manage catastrophic risks such as earthquakes. However, high dependence on reinsurance means that prices and availability of primary coverage is sensitive to the price of reinsurance. This sensitivity means that events unrelated to Missouri's earthquake risk can impact the price of insurance coverage in Missouri. For example, reinsurance became more expensive and less available after Katrina. However, the cost of reinsurance remains well below the peak of 2007, and does not appear to account for current market retractions in Missouri.

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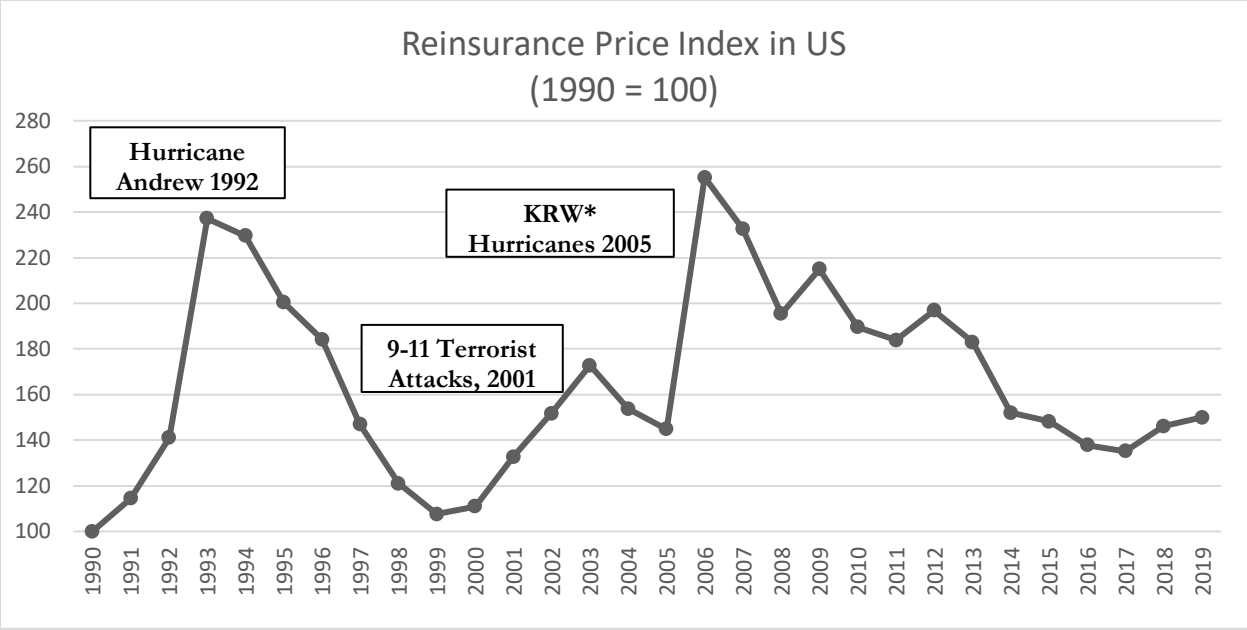
[6] California Earthquake Authority. 2017 Report to the Legislature. August, 2018. This report can be found on the CEA's website at www.earthquakeauthority.com

[7] Calculated from insurers' financial annual statements, Exhibit of Premium Written.

[8] ARTEMIS. Q1 2015 Catastrophe Bond and ILS Market Report.



***Katrina, Rita & Wilma.**
****The deepening financial crisis also had a significant impact on the price of reinsurance**
Source: Adapted from Guy Carpenter, ROL Index for US

Missouri's Contracting Earthquake Insurance Market

As the previous discussion makes clear, it doesn't appear that a lack of access to reinsurance accounts for the deterioration of the Missouri earthquake market, particularly in recent years. Rather, it appears that insurers have either determined that the New Madrid fault presents a risk greater than previously believed or, as is the case of at least one major insurer, less tolerance to insure all catastrophe risks. Allstate announced in 2006 that it was pulling out of the earthquake market in all states, describing it as a general business decision to reduce exposure to all forms of catastrophe risks.[9] At the time, Allstate had provided earthquake insurance to over 37,000 Missouri residences.

Other companies quickly followed Allstate's lead. Between 2000 and 2018, 72 insurers exited the Missouri earthquake market. Between them, these insurers had provided coverage to over 124,000 residences in 2000. While 39 insurers entered the market over the same time period, those carriers only insured 68,909 policies in 2018. Over the same period, companies that remained in the market stopped writing in high risk areas or tightened underwriting criteria, scaled back the amount and type of coverage offered, and dramatically increased prices. The net result of these market practices has been a significant decline in the number of earthquake policies issued. Since 2000, the number of homeowners policies with earthquake coverage declined by more than a quarter, from 670,968 in 2000 to 492,591 in 2018.

[9] Jolayne Hoytz. Allstate Ends Quake Coverage. **The Seattle Times,** 6/2/2006.

The remainder of this report examines these trends in detail. The figures in the following tables are derived from two primary data sources. Information pertaining to premium and policy counts[10] by geographic region is derived from residential insurance data collected by ZIP Code, pursuant to 20 CSR 600-3.100 (see http://www.sos.mo.gov/adrules/csr/current/20csr/20c600-3.pdf). Additional information was obtained by a survey of homeowners writers in the state. In 2018, insurers with a combined homeowners insurance market share of 96 percent completed a questionnaire regarding market practices with respect to providing earthquake coverage.

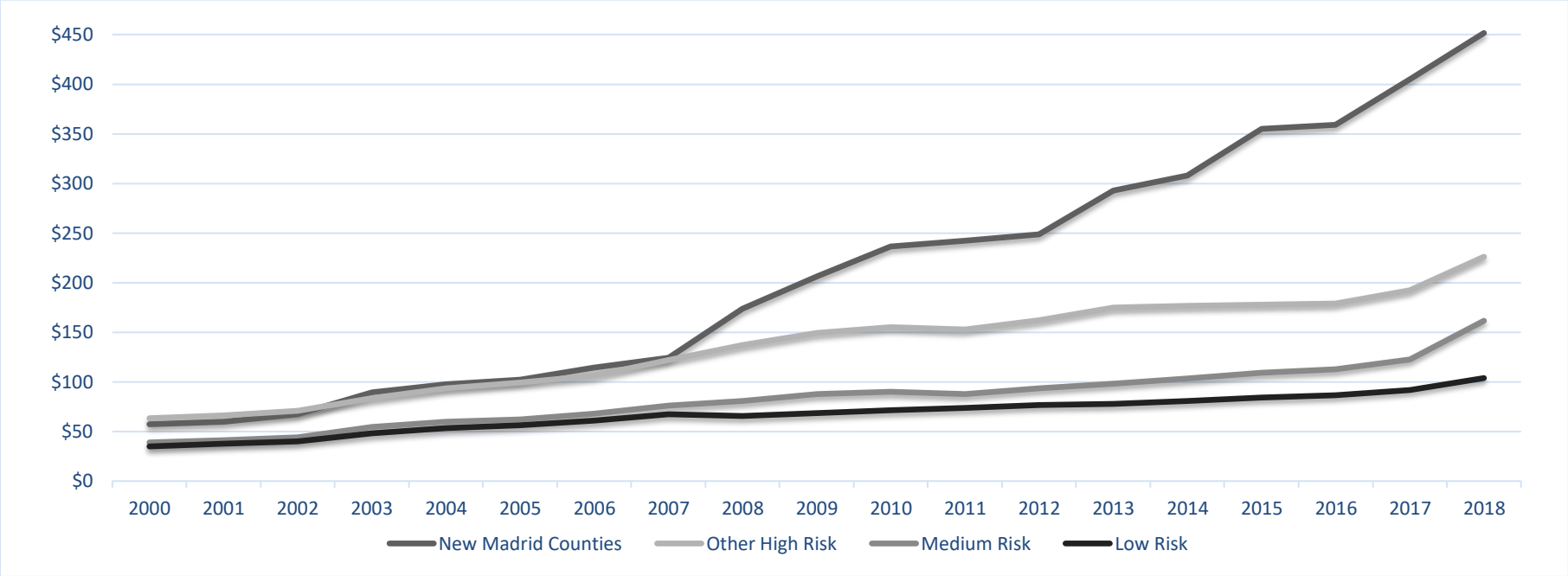
The Rising Cost of Coverage in a Declining Market

In 2000, residential earthquake coverage was readily available and inexpensive, even in the highest risk areas of the state. In that year, residents in the New Madrid region of Missouri[11] paid on average $57 per year for such coverage, an amount not significantly higher than the $35 annual premium paid by residents of the lowest risk area. Over the next 15 years, rates increased substantially, primarily within higher risk areas. By 2015, the average premium in the New Madrid area had increased by 523% to $357. While premiums also increased elsewhere in the state, the rate of increase was substantially less than experienced in New Madrid. In the lowest risk areas, premiums increased by 173% over the same time period.

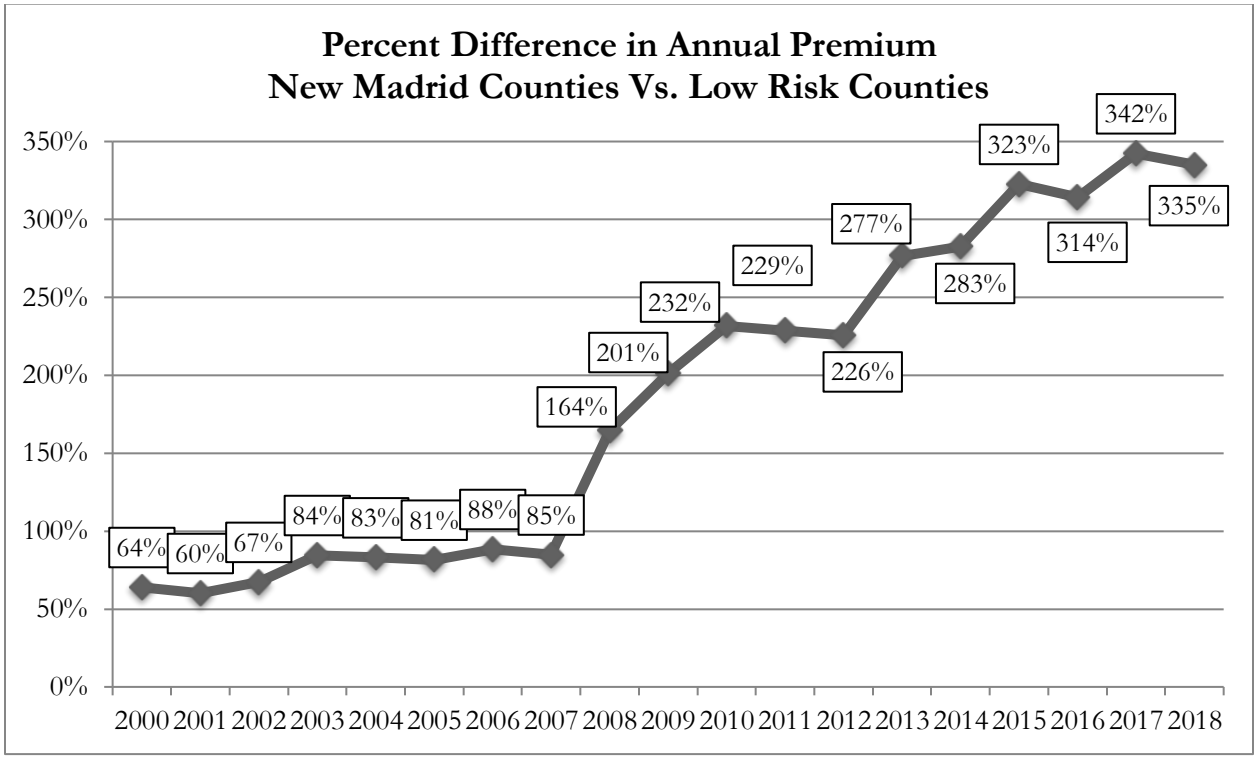
[10] Or, more strictly speaking, "exposures" rather than policy counts. The term "exposure" is equivalent to coverage for one residence for one year. Two six month policies issued in a year would count as a single exposure. To avoid overuse of specialized terminology, the terms "policies" or "covered residences" are used in this report.

[11] For purposes of this report, the region is composed of the six southeastern-most counties in Missouri: Dunklin, Mississippi, New Madrid, Pemiscot, Scott and Stoddard.

Average Annual Cost of EQ Coverage													
Region	**2000**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
New Madrid Counties	$57	$124	$174	$206	$236	$242	$249	$293	$308	$355	$359	$405	$452
Other High Risk Counties	$63	$122	$137	$149	$155	$153	$162	$175	$177	$178	$179	$192	$226
Medium Risk Counties	$39	$76	$80	$88	$90	$88	$94	$98	$104	$109	$113	$122	$161
Low Risk Counties	$35	$67	$66	$69	$71	$74	$76	$78	$81	$84	$87	$92	$104
MO Total	**$50**	**$97**	**$106**	**$115**	**$119**	**$117**	**$124**	**$131**	**$134**	**$137**	**$146**	**$149**	**$179**
% Difference-Highest v Lowest Risk Counties	62.9%	85.1%	163.6%	198.6%	232.4%	227.0%	227.6%	275.6%	280.2%	322.6%	312.6%	340.2%	334.6%

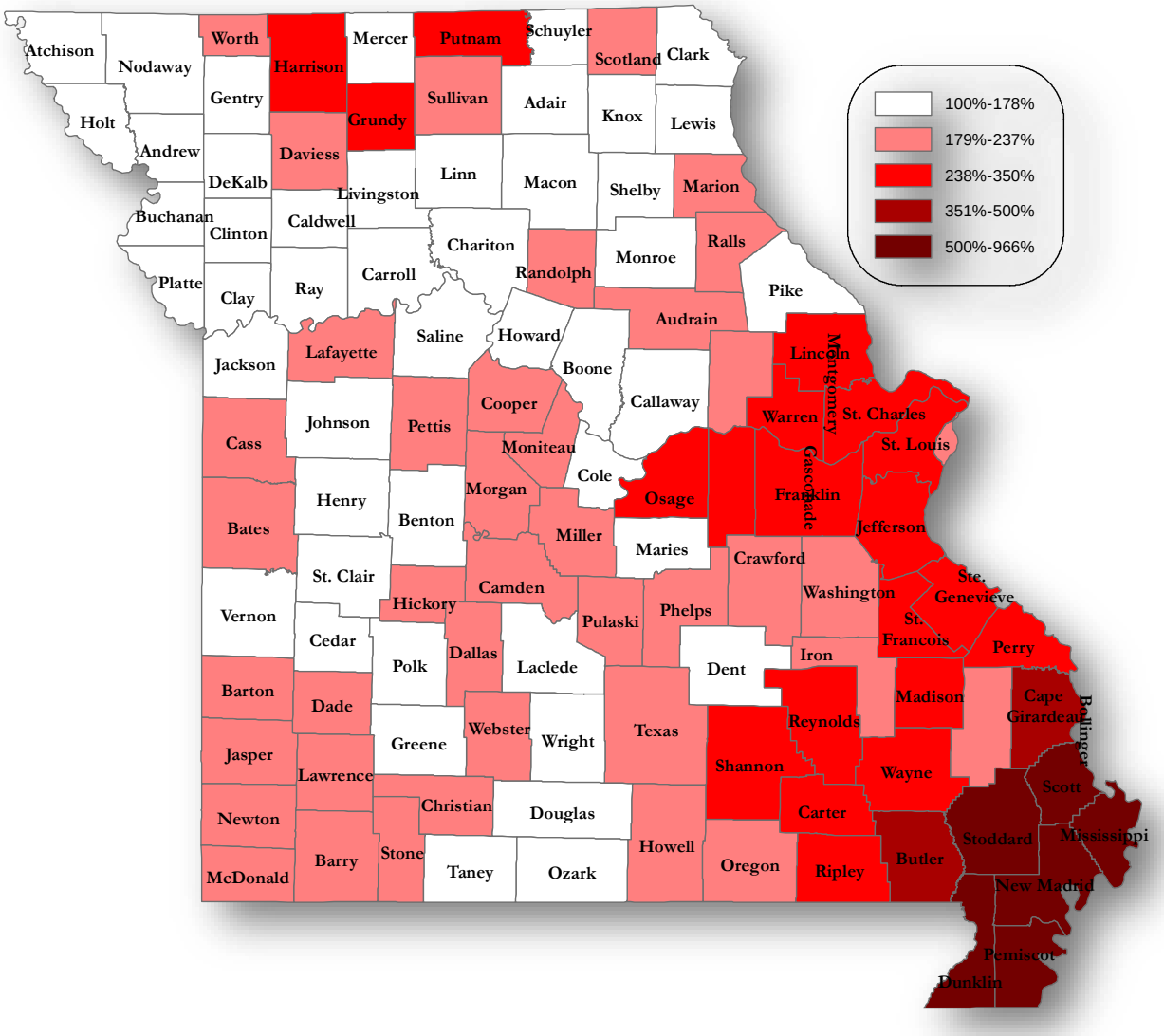


As a result of these trends, the gap in costs widened between high- and low-risk areas. In 2000, premiums in New Madrid were only 64% higher than the lowest-risk areas. The gap increased dramatically in 2008, and by 2015 had grown to 274%.



The map below depicts the change in annual premium by county. The reader will note that the rate of increase was significantly higher in counties most at risk. A table of these same data can be found in Appendix A.

% Change in Average Premium for Earthquake Coverage, 2000-2018



Declining Take-up Rates

In 2000, nearly 44 percent of all Missouri residences had earthquake coverage. In the New Madrid area, over 60 percent of homes were covered, and in other high risk areas, including St. Louis, the take-up rate was almost 70 percent. In New Madrid, the take-up rate had declined to less than 50 percent in 2008, and by 2018 had declined much further to below 14 percent. Thus, six of every seven homes in the six-county New Madrid area lacked earthquake coverage last year. The decline was less precipitous in the second highest risk area, though by 2016 less than half of residences had coverage. In the lowest risk area, comprised of the western portion of the state, coverage rates declined by nearly 9 percentage points, to 13.3 percent (see illustrations on the following page). As depicted in the following table, only in 6 counties were more than half of residences covered.

% of Residences With Earthquake Coverage	# of Counties	Number of Owner-Occupied Homes & Mobile Homes*
Less than 10%	41	215,112
10%-19.9%	44	707,197
20%-29.9%	15	203,664
30%-39.9%	6	56,175
40%-49.9%	3	62,848
50%-59.9%	5	407,778
60%-69.9%	1	119,825
Total	**115**	**1,772,603**

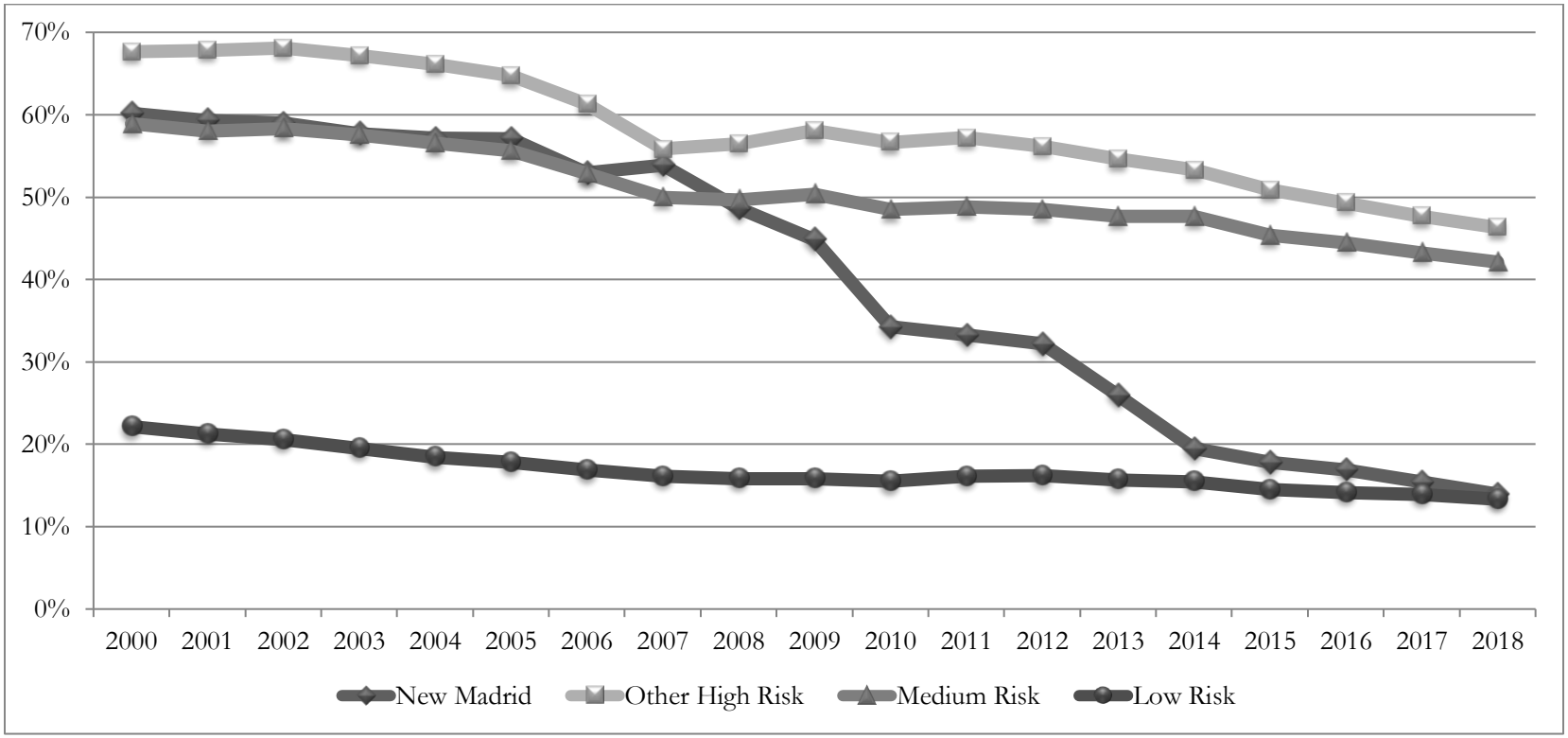
**Based on insured dwellings. A small percentage of homes that have no insurance coverage are excluded.*

In the highest risk areas, including all counties rated seven or higher on the Mercalli Scale (see map, page 3), nearly 500,000 private residences (excluding rental properties) lacked earthquake coverage in 2018. The estimated value of these uninsured residences totaled nearly $100 billion, excluding the value of the contents.

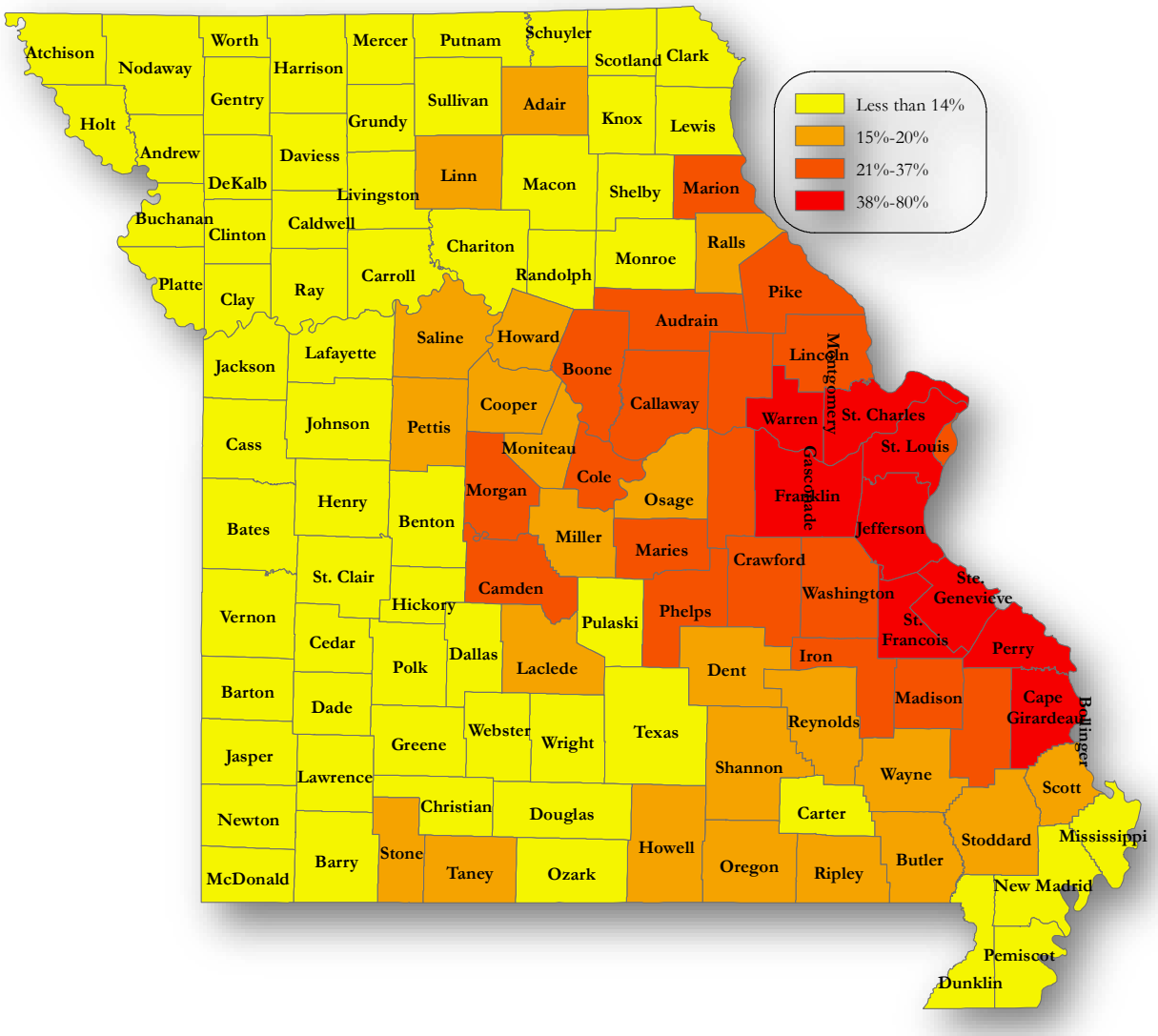
Value of Dwellings Not Insured for Earthquake Damage (uninsured homes plus value retained under deductible on insured homes)				
Earthquake Risk (Mercalli Scale)	**Uninsured Dwellings**	**Uninsured Property Value**	**Amounts Under Deductible on Insured Residences**	**Total**
7	262,798	$50,665,730,833	$5,936,484,313	$56,602,215,146
8	192,014	$40,620,827,083	$8,376,305,188	$48,997,132,271
9	29,405	$3,833,162,500	$152,944,125	$3,986,106,625
10	11,798	$1,367,817,500	$36,403,688	$1,404,221,188
7 or higher	**496,015**	**96,487,537,916**	**14,502,137,314**	**$110,989,675,230**

Source: Estimates produced by DIFP.

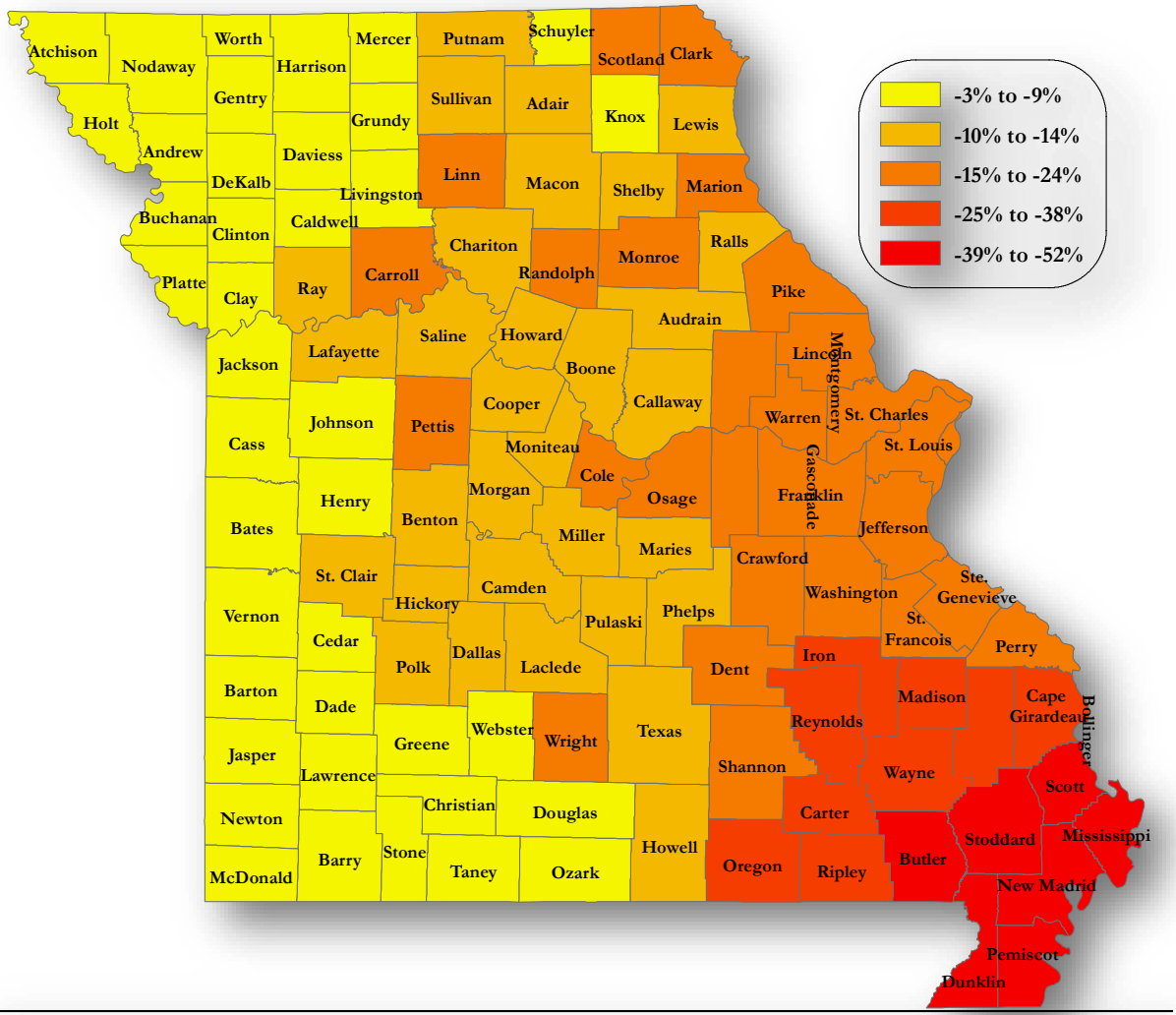
Percent of Residences with Earthquake Coverage														
Region	**2000**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Pct Point Diff.**
New Madrid	60.2%	53.9%	48.6%	44.9%	34.3%	33.3%	32.2%	25.9%	19.7%	17.8%	16.9%	17.1%	13.9%	46.3%
Other High Risk	67.6%	55.8%	56.5%	58.1%	56.6%	57.2%	56.1%	54.6%	53.5%	50.9%	49.3%	48.6%	46.3%	21.3%
Medium Risk	58.9%	50.0%	49.7%	50.4%	48.5%	48.8%	48.5%	47.6%	47.7%	45.3%	44.5%	45.8%	42.1%	16.8%
Low Risk	22.1%	16.1%	15.9%	15.8%	15.5%	16.1%	16.2%	15.7%	15.5%	14.5%	14.1%	14.7%	13.3%	8.8%
MO Total	**43.6%**	**35.2%**	**35.0%**	**35.4%**	**34.2%**	**34.6%**	**34.4%**	**33.2%**	**32.9%**	**30.6%**	**28.5%**	**30.2%**	**27.8%**	**15.8%**



Percent of Residences with Earthquake Insurance, 2018



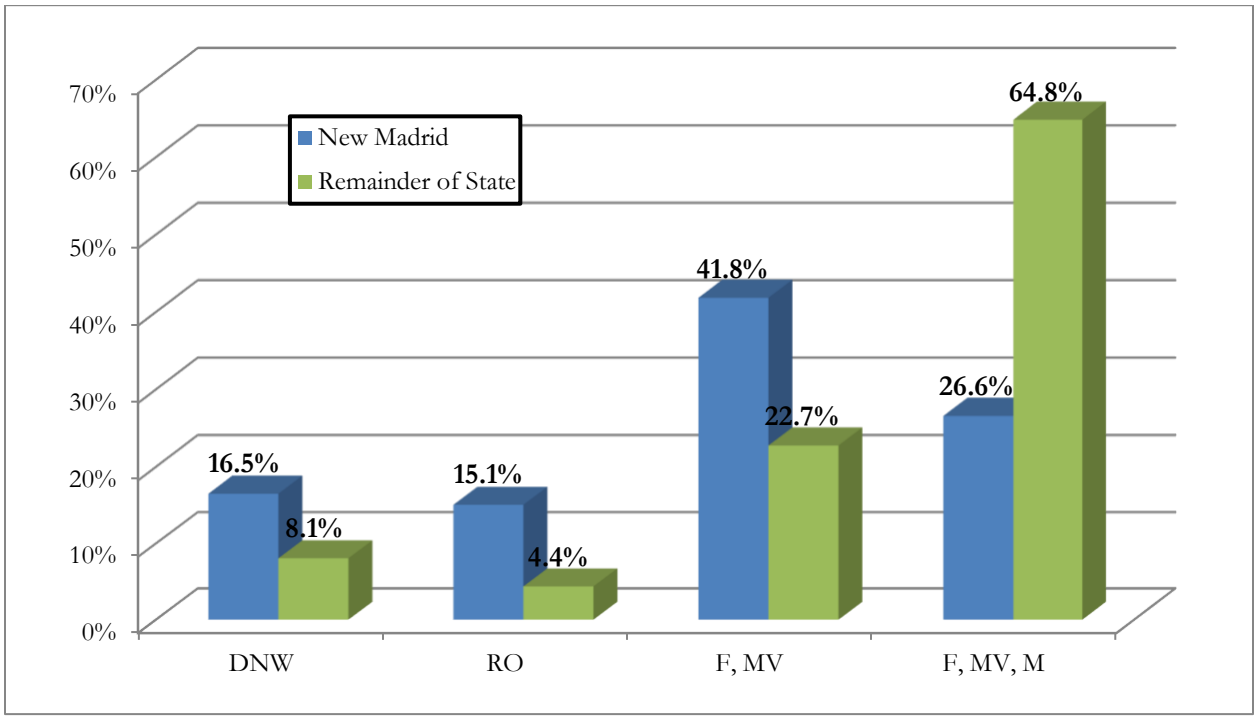
Residences With Earthquake Insurance, Percentage Point Change, 2000-2018



Declining Quality of Coverage

Based on survey responses from carriers representing over 97 percent of the homeowners market, most insurers still sell earthquake coverage in at least in some areas of the state. Weighting responses by market share, approximately 88 percent of the market still offers the coverage on both renewal and new business. However, coverage is far less available within the high-risk New Madrid area. Among respondents, nearly one-third of the market does not write new earthquake coverage at all in New Madrid (though a portion of these will renew existing earthquake business). An additional 41 percent of the market places significant additional underwriting restrictions on residences in the area, the chief restriction being that masonry homes are ineligible for coverage. In addition, residents of New Madrid may be subject to significantly higher deductibles. Only about a fourth of the market issues coverage in New Madrid on the same terms as elsewhere in the state.

Earthquake Insurance Availability, by Percent of Homeowners Market New Madrid Area vs. Remainder of the State

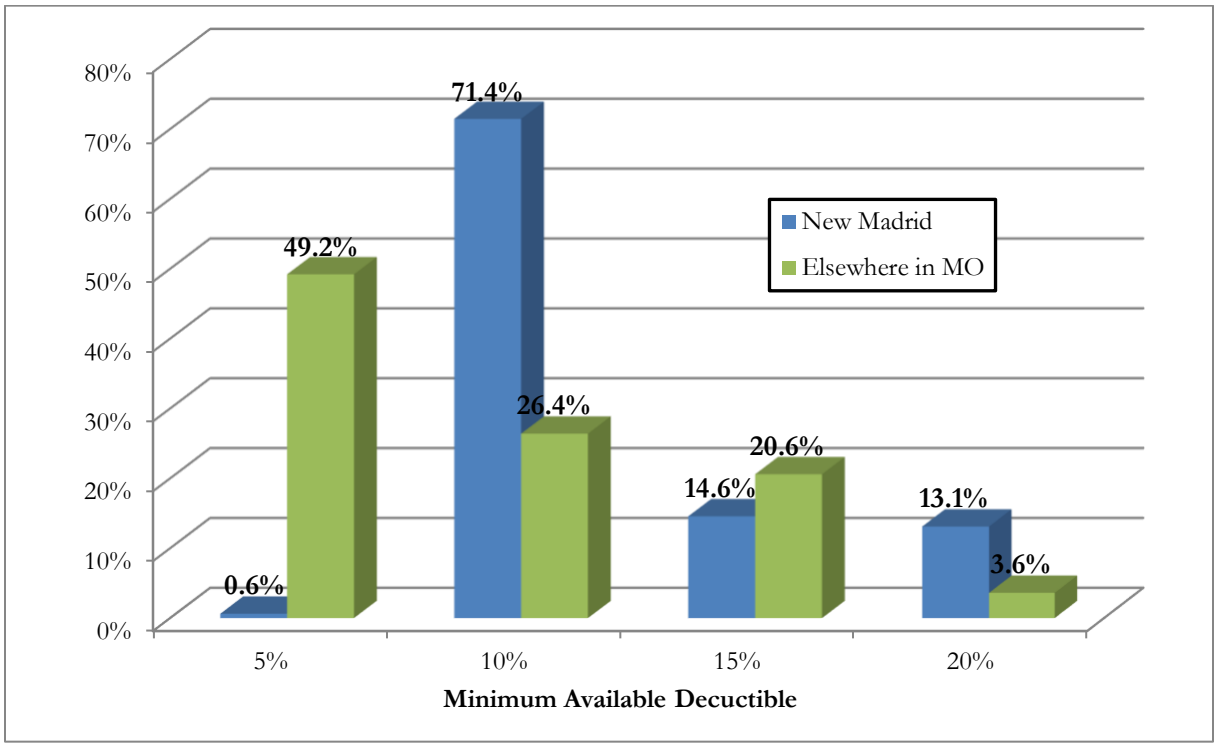


Source: DIFP survey of homeowners insurers
DNW: Does Not Write Earthquake Insurance
RO: Renewals Only
F, MV: Will provide coverage for Frame and Masonry Veneer residences, but not structures constructed with solid masonry
F, MV, M: Provides coverage for all construction types.

Even individuals with earthquake coverage are increasingly required to "self-insure" to a significant extent. Earthquake insurance typically requires deductibles specified as a percentage of the insured value of the dwelling. For example, a $200,000 home with a 10% deductible would require a homeowner to pay the first $20,000 of a claim before insurance would extend coverage. In addition, "stacked" deductibles are common, so that separate deductibles are applied to the dwelling and contents, so that hypothetical insured described above would be retain up to $40,000 of risk.

Based on the DIFP survey, about half the market offers a 5% deductible policy *outside of the New Madrid area,* though virtually no insurers offer such policies to New Madrid residents. In the six-county New Madrid area, 71 percent of insurers (weighted by market share) require a 10 percent deductible, and over a quarter require a deductible of 15% or higher.

% of Market by Minimum Available Deductible



Source: DIFP survey of homeowners insurers

Conclusion

Missouri's earthquake insurance market has significantly contracted over the past 10 to 15 years. Relatively few insurers issue earthquake coverage in the New Madrid region without significant underwriting restrictions. For example, many refuse to cover specific kinds of residences, such as masonry homes. At the same time, the price of residential earthquake insurance has increased significantly; in the highest risk area of the state average premiums paid have increased by over 700 percent since 2000. Even when homeowners can obtain coverage, they still must retain a large portion of the risk. Virtually no insurer surveyed offered a policy with a deductible of less than 10 percent of the value of the insured dwelling, while over 40 percent required a deductible of 20 percent or higher. As a result, many individuals have dropped earthquake coverage, and the market has contracted most dramatically in the New Madrid area. In 2000, over 60 percent of dwellings in the six-county New Madrid area had earthquake coverage. By 2018, less than 14 percent had such coverage. The DIFP estimates that Missouri residential property valued at nearly $110 billion is exposed to significant earthquake risk but is not insured.

A comparison with Joplin is instructive. Struck by a devastating EF5 tornado on May 22, 2011, the insurance industry responded rapidly and within three months over $1 billion was made available to insureds. By June of the following year, more than $1.5 billion had been paid by insurers, who would eventually cover more than $2 billion in tornado-related losses.[12] Almost all structures were covered for this type of loss, resulting in a rapid infusion of funds that made recovery possible. Such a recovery mechanism is almost entirely lacking in the area of the state most vulnerable to a New Madrid earthquake.

[12] Based on a special data call of all P&C insurers active in Missouri.

Appendix A: Average Annual Earthquake Premiumby County (New Madrid counties are highlighted)						
County	**2000**	**2005**	**2010**	**2015**	**2018**	**% Change, 2000-2018**
Adair	$31	$52	$58	$62	$75	140.0%
Andrew	$30	$51	$52	$58	$78	158.1%
Atchison	$35	$52	$65	$78	$86	144.5%
Audrain	$30	$50	$59	$70	$89	200.5%
Barry	$30	$50	$64	$80	$95	213.6%
Barton	$27	$42	$47	$64	$87	222.2%
Bates	$33	$62	$83	$81	$101	200.2%
Benton	$26	$38	$46	$57	$67	159.6%
Bollinger	$48	$82	$105	$126	$160	234.4%
Boone	$44	$77	$89	$93	$110	149.9%
Buchanan	$34	$52	$63	$70	$84	150.2%
Butler	$64	$100	$175	$254	$324	403.9%
Caldwell	$29	$59	$65	$65	$72	151.1%
Callaway	$32	$55	$66	$73	$89	174.8%
Camden	$36	$55	$76	$90	$114	219.8%
Cape Girardeau	$68	$107	$178	$245	$334	392.7%
Carroll	$30	$37	$48	$60	$71	137.1%
Carter	$34	$61	$101	$105	$137	307.4%
Cass	$35	$57	$68	$80	$104	197.4%
Cedar	$31	$48	$59	$71	$79	155.5%
Chariton	$29	$56	$66	$55	$73	149.2%
Christian	$37	$60	$74	$87	$104	181.1%
Clark	$29	$41	$50	$56	$62	113.1%
Clay	$36	$55	$62	$74	$94	165.7%
Clinton	$34	$55	$57	$64	$84	150.4%
Cole	$43	$62	$77	$93	$113	163.7%
Cooper	$33	$49	$61	$82	$95	190.9%
Crawford	$30	$54	$63	$69	$87	191.6%
Dade	$27	$43	$55	$69	$87	228.5%
Dallas	$28	$44	$53	$75	$84	200.4%
Daviess	$31	$61	$67	$75	$87	180.1%
DeKalb	$37	$55	$57	$70	$80	115.4%
Dent	$31	$53	$66	$67	$78	156.0%
Douglas	$27	$39	$42	$59	$64	131.3%
Dunklin	$57	$112	$234	$420	$514	808.2%
Franklin	$37	$64	$96	$111	$153	313.6%
Gasconade	$29	$47	$65	$82	$105	267.0%
Gentry	$32	$59	$75	$72	$82	154.8%

Greene	$39	$60	$73	$88	$106	172.6%
Grundy	$27	$40	$56	$75	$96	252.8%
Harrison	$24	$33	$44	$67	$84	250.9%
Henry	$30	$51	$62	$65	$77	160.6%
Hickory	$24	$34	$43	$58	$81	235.5%
Holt	$35	$55	$73	$76	$86	150.6%
Howard	$29	$54	$64	$64	$78	171.7%
Howell	$31	$62	$76	$73	$88	189.7%
Iron	$32	$50	$71	$80	$100	215.2%
Jackson	$41	$62	$73	$87	$103	150.7%
Jasper	$31	$47	$60	$77	$95	202.4%
Jefferson	$38	$59	$88	$107	$166	340.1%
Johnson	$33	$59	$64	$76	$84	150.6%
Knox	$27	$50	$54	$60	$66	147.3%
Laclede	$30	$46	$60	$74	$78	157.6%
Lafayette	$29	$50	$57	$70	$85	187.8%
Lawrence	$27	$44	$63	$76	$89	227.4%
Lewis	$25	$48	$60	$58	$68	167.1%
Lincoln	$34	$59	$74	$80	$137	301.1%
Linn	$27	$37	$40	$47	$59	119.2%
Livingston	$28	$41	$47	$57	$71	151.5%
McDonald	$23	$39	$50	$61	$74	219.6%
Macon	$27	$50	$52	$56	$73	171.1%
Madison	$34	$55	$82	$108	$126	273.0%
Maries	$29	$52	$62	$64	$74	152.6%
Marion	$29	$50	$60	$64	$81	179.9%
Mercer	$28	$39	$50	$54	$63	125.9%
Miller	$26	$46	$57	$67	$85	227.0%
Mississippi	$52	$97	$235	$338	$403	683.1%
Moniteau	$27	$50	$59	$67	$86	212.4%
Monroe	$26	$49	$57	$58	$72	177.2%
Montgomery	$31	$54	$68	$76	$101	228.2%
Morgan	$26	$42	$51	$65	$82	219.9%
New Madrid	$54	$85	$281	$378	$502	823.8%
Newton	$27	$42	$55	$68	$82	199.2%
Nodaway	$33	$58	$62	$65	$76	128.3%
Oregon	$33	$56	$69	$89	$99	194.9%
Osage	$32	$85	$107	$102	$130	301.2%
Ozark	$28	$42	$45	$55	$69	147.1%
Pemiscot	$48	$97	$248	$420	$513	965.7%
Perry	$42	$63	$95	$142	$178	320.7%
Pettis	$27	$42	$51	$65	$78	185.0%
Phelps	$32	$54	$68	$77	$94	191.4%

Pike	$36	$61	$75	$76	$92	158.6%
Platte	$46	$70	$81	$99	$114	145.8%
Polk	$31	$47	$60	$74	$86	175.7%
Pulaski	$29	$58	$74	$86	$96	227.3%
Putnam	$30	$56	$67	$92	$118	294.8%
Ralls	$27	$45	$57	$59	$86	220.9%
Randolph	$25	$41	$52	$60	$73	196.2%
Ray	$32	$52	$64	$68	$82	157.0%
Reynolds	$31	$63	$86	$81	$107	249.7%
Ripley	$38	$59	$82	$126	$146	286.3%
Saint Charles	$42	$66	$100	$122	$191	349.6%
Saint Clair	$28	$45	$55	$73	$78	178.1%
Sainte Genevieve	$42	$62	$87	$130	$163	288.5%
Saint Francois	$35	$61	$79	$94	$123	255.1%
Saint Louis	$64	$101	$157	$179	$227	253.0%
Saline	$28	$39	$52	$62	$75	168.2%
Schuyler	$27	$45	$58	$61	$60	124.9%
Scotland	$27	$44	$56	$69	$78	186.0%
Scott	$65	$106	$274	$380	$493	656.3%
Shannon	$28	$53	$73	$97	$103	267.8%
Shelby	$27	$49	$56	$57	$66	141.1%
Stoddard	$54	$101	$169	$258	$337	519.4%
Stone	$37	$54	$72	$85	$106	184.8%
Sullivan	$22	$36	$41	$55	$66	198.0%
Taney	$34	$49	$61	$72	$84	146.7%
Texas	$30	$57	$68	$77	$86	182.8%
Vernon	$28	$44	$54	$65	$74	160.9%
Warren	$36	$56	$80	$92	$141	294.4%
Washington	$30	$44	$54	$71	$87	189.8%
Wayne	$34	$53	$84	$117	$145	330.7%
Webster	$33	$54	$77	$89	$111	237.8%
Worth	$29	$32	$52	$60	$95	224.7%
Wright	$32	$44	$52	$66	$79	148.5%
Saint Louis City	$68	$103	$167	$181	$211	209.2%
Total	**$50**	**$79**	**$119**	**$137**	**$179**	**260.6%**

Appendix B

Percent of Residences With Earthquake Coverage
(New Madrid Counties are Highlighted)

County	2000	2005	2010	2015	2018	Percentage Point Difference, 2000-2018
Adair	29.1%	22.9%	20.1%	17.0%	14.7%	-14.4%
Andrew	18.5%	14.9%	12.5%	10.8%	9.9%	-8.6%
Atchison	10.2%	8.4%	8.0%	6.9%	6.7%	-3.5%
Audrain	36.2%	31.9%	30.8%	26.6%	24.2%	-11.9%
Barry	15.4%	11.7%	8.9%	8.6%	8.8%	-6.7%
Barton	12.6%	9.8%	7.8%	7.1%	5.7%	-6.8%
Bates	13.0%	8.6%	5.9%	5.5%	4.7%	-8.3%
Benton	22.4%	16.9%	14.7%	13.2%	12.1%	-10.4%
Bollinger	62.4%	57.1%	38.9%	33.1%	30.9%	-31.4%
Boone	37.6%	29.8%	27.0%	25.4%	24.3%	-13.2%
Buchanan	16.5%	12.9%	11.2%	9.6%	8.9%	-7.7%
Butler	57.3%	51.8%	33.8%	20.4%	17.0%	-40.3%
Caldwell	11.4%	7.8%	6.6%	6.5%	5.6%	-5.8%
Callaway	37.5%	31.9%	27.0%	25.5%	24.0%	-13.5%
Camden	42.1%	40.0%	37.5%	35.8%	32.8%	-9.2%
Cape Girardeau	81.2%	79.5%	71.9%	59.3%	55.1%	-26.1%
Carroll	23.0%	16.6%	10.6%	9.9%	8.3%	-14.7%
Carter	47.7%	42.4%	20.7%	16.2%	13.6%	-34.1%
Cass	19.4%	13.9%	11.6%	11.1%	10.7%	-8.7%
Cedar	14.3%	11.7%	9.1%	8.1%	6.5%	-7.8%
Chariton	24.0%	18.3%	15.9%	16.0%	12.2%	-11.8%
Christian	16.1%	11.6%	11.8%	10.7%	9.6%	-6.5%
Clark	22.3%	17.1%	12.6%	9.6%	7.5%	-14.8%
Clay	20.5%	15.2%	13.0%	12.3%	11.9%	-8.7%
Clinton	15.3%	10.7%	8.8%	7.8%	8.0%	-7.3%
Cole	43.5%	37.9%	32.5%	29.5%	26.5%	-17.0%
Cooper	26.9%	20.5%	15.7%	16.1%	15.0%	-11.9%
Crawford	45.4%	42.9%	36.2%	32.1%	28.2%	-17.2%
Dade	12.5%	9.1%	7.5%	6.8%	5.9%	-6.5%
Dallas	15.8%	9.7%	6.6%	6.0%	5.1%	-10.8%
Daviess	9.9%	6.2%	5.2%	5.4%	5.0%	-4.9%
DeKalb	8.9%	6.5%	4.3%	4.3%	4.1%	-4.8%
Dent	32.3%	24.8%	20.4%	18.0%	14.5%	-17.7%
Douglas	12.6%	10.5%	10.4%	8.8%	7.7%	-4.9%
Dunklin	55.7%	47.3%	30.4%	14.0%	11.2%	-44.5%

Franklin	64.5%	61.4%	52.6%	49.5%	45.7%	-18.8%
Gasconade	48.9%	48.1%	42.9%	38.0%	29.8%	-19.1%
Gentry	12.9%	8.8%	7.2%	6.7%	5.2%	-7.7%
Greene	18.7%	14.1%	13.0%	11.9%	11.0%	-7.8%
Grundy	12.8%	9.9%	7.3%	6.7%	5.5%	-7.3%
Harrison	8.7%	6.1%	4.4%	4.5%	4.4%	-4.3%
Henry	20.1%	16.6%	14.6%	13.7%	11.9%	-8.2%
Hickory	19.4%	14.7%	10.9%	9.7%	8.1%	-11.2%
Holt	9.4%	5.4%	4.8%	4.4%	3.7%	-5.7%
Howard	32.5%	26.9%	23.6%	22.9%	20.1%	-12.4%
Howell	33.5%	27.9%	24.2%	23.3%	19.5%	-14.0%
Iron	56.8%	49.4%	36.9%	35.8%	30.3%	-26.5%
Jackson	17.1%	12.9%	11.3%	11.1%	10.5%	-6.6%
Jasper	18.2%	15.6%	13.8%	14.1%	12.6%	-5.6%
Jefferson	72.8%	70.0%	60.0%	56.5%	53.2%	-19.6%
Johnson	20.1%	14.5%	12.2%	12.3%	11.7%	-8.4%
Knox	16.4%	13.3%	11.8%	10.2%	8.3%	-8.1%
Laclede	28.4%	23.4%	20.6%	17.4%	15.2%	-13.2%
Lafayette	23.2%	16.1%	13.3%	13.2%	11.8%	-11.4%
Lawrence	15.0%	10.2%	7.8%	8.1%	6.8%	-8.2%
Lewis	22.9%	18.5%	16.1%	13.6%	10.7%	-12.3%
Lincoln	53.8%	49.8%	44.4%	42.0%	38.0%	-15.8%
Linn	30.6%	27.0%	23.7%	19.8%	15.7%	-14.9%
Livingston	15.7%	11.1%	11.6%	10.0%	8.9%	-6.8%
Mcdonald	13.5%	7.5%	5.8%	5.7%	5.2%	-8.3%
Macon	24.7%	17.9%	17.3%	14.6%	12.0%	-12.7%
Madison	65.7%	59.9%	39.5%	37.9%	36.9%	-28.8%
Maries	31.0%	29.7%	22.4%	24.1%	21.5%	-9.4%
Marion	41.5%	36.2%	33.9%	28.8%	26.3%	-15.2%
Mercer	10.2%	7.2%	5.7%	5.3%	4.3%	-5.9%
Miller	24.3%	20.5%	17.4%	16.7%	14.5%	-9.8%
Mississippi	60.1%	54.1%	30.0%	13.3%	8.7%	-51.4%
Moniteau	24.2%	20.3%	19.1%	16.4%	15.0%	-9.2%
Monroe	31.6%	25.0%	21.3%	18.1%	13.4%	-18.2%
Montgomery	47.2%	42.4%	36.6%	31.7%	29.6%	-17.7%
Morgan	35.6%	33.7%	30.4%	26.8%	24.0%	-11.5%
New Madrid	51.2%	54.8%	27.7%	14.9%	12.3%	-38.9%
Newton	14.0%	9.6%	8.5%	9.0%	8.2%	-5.8%
Nodaway	7.1%	5.2%	4.7%	4.4%	4.0%	-3.1%
Oregon	42.7%	36.8%	24.1%	23.5%	18.4%	-24.3%
Osage	33.3%	28.4%	23.8%	20.6%	18.3%	-15.0%
Ozark	18.5%	15.8%	14.1%	12.9%	12.4%	-6.1%
Pemiscot	49.4%	45.7%	21.1%	12.3%	11.0%	-38.4%

Perry	77.4%	79.2%	71.9%	66.8%	58.5%	-18.9%
Pettis	30.9%	25.3%	19.2%	16.0%	15.4%	-15.5%
Phelps	34.7%	28.9%	25.6%	24.4%	22.2%	-12.4%
Pike	41.3%	35.8%	30.3%	25.4%	22.0%	-19.2%
Platte	18.8%	14.3%	12.3%	12.1%	12.3%	-6.5%
Polk	17.8%	11.9%	10.5%	10.0%	8.3%	-9.4%
Pulaski	25.9%	18.9%	13.4%	13.1%	12.4%	-13.5%
Putnam	16.5%	9.9%	6.9%	7.3%	6.4%	-10.1%
Ralls	31.2%	27.1%	25.7%	24.5%	20.6%	-10.6%
Randolph	30.9%	24.9%	20.5%	17.0%	13.9%	-17.0%
Ray	19.0%	14.1%	11.4%	10.7%	8.9%	-10.1%
Reynolds	42.4%	32.6%	21.4%	18.7%	17.6%	-24.9%
Ripley	44.3%	41.7%	24.4%	18.0%	16.0%	-28.4%
Saint Charles	79.2%	75.4%	67.0%	63.7%	60.1%	-19.1%
Saint Clair	14.9%	9.8%	6.0%	5.9%	5.4%	-9.4%
Sainte Genevieve	76.1%	75.9%	68.7%	64.0%	54.0%	-22.1%
Saint Francois	65.4%	64.5%	56.7%	50.7%	45.2%	-20.2%
Saint Louis	74.4%	70.7%	62.9%	57.8%	53.1%	-21.3%
Saline	25.7%	21.6%	19.3%	18.2%	15.8%	-9.9%
Schuyler	13.9%	12.5%	9.5%	6.4%	5.2%	-8.6%
Scotland	20.9%	13.8%	12.1%	9.4%	5.8%	-15.0%
Scott	70.0%	67.9%	41.5%	22.7%	18.0%	-52.1%
Shannon	31.3%	22.3%	19.0%	17.0%	14.7%	-16.5%
Shelby	21.9%	16.0%	14.4%	14.3%	10.5%	-11.3%
Stoddard	63.9%	61.4%	42.2%	20.7%	15.3%	-48.7%
Stone	18.1%	15.2%	14.6%	14.8%	14.5%	-3.6%
Sullivan	14.9%	9.3%	7.1%	5.7%	4.7%	-10.2%
Taney	20.2%	18.1%	17.0%	16.8%	16.2%	-4.0%
Texas	24.6%	18.9%	14.2%	11.8%	10.9%	-13.7%
Vernon	17.0%	12.2%	9.8%	8.9%	8.9%	-8.1%
Warren	60.7%	59.3%	49.5%	49.0%	45.1%	-15.6%
Washington	53.9%	48.2%	37.2%	36.1%	30.9%	-23.0%
Wayne	51.9%	43.1%	25.1%	18.8%	16.8%	-35.1%
Webster	17.8%	13.1%	11.5%	10.8%	9.4%	-8.4%
Worth	7.8%	5.3%	4.8%	4.5%	4.8%	-3.0%
Wright	23.9%	18.0%	13.9%	11.8%	9.1%	-14.8%
Saint Louis City	46.1%	45.9%	36.2%	30.5%	26.1%	-20.1%
Total	**43.6%**	**39.8%**	**34.2%**	**30.6%**	**27.8%**	**-15.8%**

INSURANCE

CONSUMER HOTLINE

800-726-7390

For questions about your insurance policy or to file a complaint against an insurance company or agent:

difp.mo.gov
800-726-7390

DIFP Department of Insurance, Financial Institutions & Professional Registration