

# Playing with Fire? Testing Moral Hazard in Homeowners Insurance Valued Policies

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## ABSTRACT

*Insurance policy design and regulation continually grapples with moral hazard concerns. Yet these concerns rest largely on theory-based assumptions about how rational economic actors will respond to financial incentives. Advances in behavioral economics call these assumptions into question.*

*This Article conducts an empirical test of moral hazard in homeowners insurance markets. Eighteen states' "valued policy" laws require more generous compensation by insurers for certain total house losses. I test the moral hazard prediction that fire rates will consequently be higher in these states than in others. Using a private insurance database on the cause of loss for over four million residential insurance claims from 2002 through 2011, I find that, surprisingly, loss rates are significantly lower in valued policy states, not higher. I also use Louisiana's unexpected elimination of these laws as an additional means to assess the laws' effects. As before, fire rates are significantly higher when economic incentives appear lower.*

*These results are inconsistent with standard moral hazard predictions, but I demonstrate how they are consistent with a broader conceptualization of moral hazard theory. First, the results show the importance of recognizing policyholders' responsiveness to irrelevant factors that they nevertheless believe will affect their insurance payments, like housing prices, rather than the low-salience economic factors that truly determine these payments, like valued policy laws. Second, the results show how focusing exclusively on policyholder behavior misses how other actors, like insurance companies, also adjust to mitigate or even entirely eliminate moral hazard considerations.*

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## INTRODUCTION

Insurance is a multi-trillion dollar industry.<sup>1</sup> By appealing to policyholders' risk aversion, insurance companies provide policyholders with replacement of income and assets after a loss in exchange for comparatively small upfront premium payments. This transfer of risk enhances social welfare, providing such valuable benefits as spreading the risk of unlucky health predispositions;<sup>2</sup> promoting efficient investment projects;<sup>3</sup> and serving private regulatory functions.<sup>4</sup> The advantages of private insurance are so compelling that governments even subsidize private insurance markets<sup>5</sup> and the purchase of insurance by private individuals.<sup>6</sup>

However, insurance brings the potential for perverse increases in risk levels and losses, a phenomenon known as moral hazard.<sup>7</sup> Because insurance companies agree to cover some or all of a policyholder's loss, a

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<sup>1</sup> NAT'L ASS'N OF INS. COMM'RS, PROPERTY & CASUALTY INSURANCE INDUSTRY (2016) (\$587 billion in annual property and casualty insurance premiums); NAT'L ASS'N OF INS. COMM'RS, LIFE & FRATERNAL INSURANCE INDUSTRY (2016) (\$803 billion in annual life related premiums); *National Health Expenditures Fact Sheet*, CENTERS FOR MEDICARE & MEDICAID SERVICES (Dec. 3, 2015), <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet.html> (\$991 billion in annual private health insurance premiums).

<sup>2</sup> A major initiative of the Affordable Care Act set out to accomplish this goal by eliminating insurers' ability to vary health insurance premiums based on these risk characteristics. Patient Protection and Affordable Care Act, Pub. L. No. 111-148, § 1201, 124 Stat. 119 (adding 42 U.S.C. § 300gg).

<sup>3</sup> If risk-averse policyholders lost investments in their property upon property destruction, the uncertainty would push them instead towards safer uses, such as general savings.

<sup>4</sup> Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197 (2012).

<sup>5</sup> See, e.g., Terrorism Risk Insurance Act of 2002, Pub. L. No. 107-297 (creating a government-subsidized terrorism property insurance program); see generally George L. Priest, *The Government, the Market, and the Problem of Catastrophic Loss*, 12 J. RISK & UNCERTAINTY 219, 225–35 (1996) (identifying problems with past government-subsidized insurance programs).

<sup>6</sup> See, e.g., Peter Molk, *The Government's Role in Climate Change Insurance*, 43 B.C. ENVTL. AFF. L. REV. 411 (2016) (discussing subsidized flood insurance); U.S. GOV'T ACCOUNTABILITY OFF., GAO-15-290, *High Risk Series: An Update* 80 (2015), <http://www.gao.gov/assets/670/668415.pdf> (discussing crop insurance subsidies); Peter Molk, *The Ownership of Health Insurers*, 2016 U. ILL. L. REV. 873 (discussing cooperative health insurer subsidies). In addition, insurance provided through employment enjoys the subsidy of avoiding federal tax on the equivalent amount of income. See INTERNAL REVENUE SERV., PUBLICATION 15-B: EMPLOYER'S GUIDE TO TAX FRINGE BENEFITS (2016), <https://www.irs.gov/pub/irs-pdf/p15b.pdf> (2015).

<sup>7</sup> While the term "moral hazard" originated in the insurance industry, its intuition has since been applied to other markets. See, e.g., Gilles Chemla & Christopher A. Hennessy, *Skin in the Game and Moral Hazard*, 69 J. FIN. 1597 (2014) (applying the idea of moral hazard to asset securitization); Tom Baker, *On the Genealogy of Moral Hazard*, 75 TEX. L. REV. 237 (1996) (exploring the origins of the term).

policyholder's incentive to avoid those losses is reduced.<sup>8</sup> With insurance to reimburse if a loss materializes, a rational policyholder takes fewer precautions against losses, and engages in riskier activity in a riskier way, than she would without insurance. These costs can entirely eliminate insurance's positive effects.

Moral hazard is a dominant concern of insurance companies and regulators, who must balance protecting policyholder losses against the resultant potential for risk increase. Much money and time are spent at crafting policy language that not only protects policyholders, but also ensures they take appropriate loss-preventative measures. Yet despite the focus on moral hazard, its effects are mostly derived from theoretical economic models of policyholder behavior. Whether theory translates into actual behavior is largely an unanswered question; empirical evidence on moral hazard is sparse. This Article provides new evidence in the context of homeowners insurance.

According to economic theory, moral hazard will depend on a number of factors, including how adequately insurance payments substitute for policyholder loss, the policyholder's ability to control the incidence of loss, and the policyholder's calculated economic rationality.<sup>9</sup> Straightforward applications of these factors accurately predict some observed insurance market moral hazard. For example, long term disability insurance claims rise as insurance payments increase and preliminary waiting periods decrease.<sup>10</sup> And the generosity of workers' compensation has been found to have no significant impact on either the number of workplace accidents or the number of serious accidents, as insurer dollars are a poor substitute for well-being.<sup>11</sup> But other observed behavior is seemingly inconsistent with this theory. Diabetics, for instance, apparently are willing to trade health for dollars despite the imperfect substitutability between the two; studies find diabetics to be unhealthier in states that require insurers to cover the disease.<sup>12</sup> Similarly, driving safety is worse when automobile liability insurance premiums do not incorporate prior accidents.<sup>13</sup> Yet

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<sup>8</sup> See, e.g., Joseph E. Stiglitz, *Risk, Incentives and Insurance: The Pure Theory of Moral Hazard*, 8 GENEVA PAPERS ON RISK & INS. 6 (1983) (“[T]he more and better insurance that is provided against some contingency, the less incentive individuals have to avoid the insured event, because the less they bear the full consequences of their actions.”)

<sup>9</sup> See generally Baker, *supra* note 7, at 277 – 83 (discussing these factors, among others).

<sup>10</sup> David Autor, Mark Duggan, & Jonathan Gruber, *Moral Hazard and Claims Deterrence in Private Disability Insurance*, 6 AM. ECON. J. APPLIED ECON. 110 (2014).

<sup>11</sup> Emily A. Spieler, *Perpetuating Risk? Workers' Compensation and the Persistence of Occupational Injuries*, 31 HOUS. L. REV. 119 (1994); Richard J. Butler & John D. Worrall, *Claims Reporting and Risk Bearing Moral Hazard in Workers' Compensation*, 58 J. RISK & INS. 191 (1991).

<sup>12</sup> Jonathan Klick & Thomas Stratmann, *Diabetes Treatments and Moral Hazard*, 50 J.L. & ECON. 519 (2007) (finding diabetics are unhealthier in states requiring insurers to treat the disease). Other observations are more in line with standard moral hazard theory predictions. See Willard G. Manning et al., *Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment*, 77 AM. ECON. REV. 251 (1987) (finding greater use of healthcare services when subsidized by insurance); Liran Einav et

Homeowners insurance markets are not immune to moral hazard fears. Applying the standard moral hazard model to homeowners insurance provides reason for concern. Homeowners may have no sentimental attachments to their homes and might be better off using insurance proceeds as a means of monetizing an illiquid asset.<sup>14</sup> In the worst of circumstances, homeowners might collect more in insurance proceeds than the value of their home, making house destruction a wise investment.<sup>15</sup> And even factors seemingly outside homeowners' direct control, such as natural disasters, may be exacerbated by homeowners' increased willingness to live in risky areas because of an insurance backstop.<sup>16</sup>

On the one hand, some losses – those from forest fires, for example – will be largely outside the control of homeowners. And for some homeowners, insurance proceeds may only poorly compensate for the lost security and sentimental value as one's homestead goes up in flames.<sup>17</sup>

Yet even when theoretical models uniformly predict moral hazard, studies show that actual behavior can diverge substantially from these predictions.<sup>18</sup> When theory presents a mixed picture, as here, empirical evidence is even more valuable. Unfortunately, although homeowners insurance is a robust market with a staggering \$88 billion in annual premium payments,<sup>19</sup> empirical studies of homeowner moral hazard are few and draw only limited conclusions.<sup>20</sup>

This Article conducts an original test of moral hazard in homeowners insurance markets, using a private insurance industry database on the

al., *Selection on Moral Hazard in Health Insurance*, 103 AM. ECON. REV. 178 (2013) (finding that policyholders who are also more likely to consume medical services also select into more comprehensive health insurance plans, facilitating this moral hazard); Baker, *supra* note 7, at 242 (suggesting these outcomes follow from standard moral hazard theory).

<sup>13</sup> Baker, *supra* note 7, at 284 – 85 (suggesting that actual drivers would not make this tradeoff); Alma Cohen & Rajeev Dehejia, *The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities*, 47 J.L. & ECON. 357 (2004) (empirically arguing that automobile insurance leads to more traffic fatalities).

<sup>14</sup> *Id.* (acknowledging the substitutability of money for investment property).

<sup>15</sup> Arguments along these lines have long been advanced by the insurance industry, regulators, and academics. See *infra* Part I for discussion of these arguments.

<sup>16</sup> The availability of flood insurance has long been thought to have spurred economic development in loss-prone coastal areas. See, e.g., Kenneth J. Bagstad, Kevin Stapleton, & John R. D'Agostino, *Taxes, Subsidies, and Insurance as Drivers of United States Coastal Development*, 63 ECOLOGICAL ECON. 285, 287 (2007); Molk, *supra* note 6 (examining subsidized insurance's exacerbating role on policyholder moral hazard).

<sup>17</sup> Baker, *supra* note 7, at 278 (noting in addition that “money cannot replace . . . much of what is important in life.”)

<sup>18</sup> See *supra* notes 10 – 11 and accompanying text.

<sup>19</sup> NAT'L ASS'N OF INS. COMM'RS, PROPERTY & CASUALTY INSURANCE INDUSTRY, *supra* note 1 (HO-3 policies).

<sup>20</sup> Two recent exceptions are Michael D. Eriksen & James M. Carson, *A Burning Question: Does Arson Increase when Local House Prices Decline?*, 8 J. RISK & INS. 7 (2017); Paul R. Goebel & David M. Harrison, *Money to Burn: Economic Incentives and the Incidence of Arson*, 21 J. HOUSING RES. 49 (2012). For discussion of these and their limitations when applied to actual insurance markets, see *infra* Part I.

cause of loss for over four million homeowners insurance claims from 2002 through 2011. By exploiting variation in state “valued policy” insurance laws that either do or do not allow policyholders to collect more insurance proceeds than the value of their homes, I test directly whether policyholders respond to economic incentives as standard moral hazard theory predicts.

The results are surprising. I find that loss rates from covered causes are *lower*, rather than higher, in those states that allow policyholders excess financial recoveries. I estimate these lower loss rates to correspond to roughly \$250 million per year in residential property damage. Moreover, taking advantage of a change in Louisiana law that removed policyholders’ excess profit potential in 2008, I similarly find that loss rates from covered causes *rise*, rather than fall, in Louisiana after the profit incentive is removed. These empirical results directly contradict standard moral hazard theory predictions.

The findings have several useful implications. Most obviously, they show that the presumed moral hazard costs of valued policy laws are not nearly as great as critics fear. In 2013, industry representatives successfully opposed Colorado’s proposed adoption of these laws by pointing, among other things, to the laws’ potential to lead “people in need of money . . . [to] deliberately set their houses on fire just to get an amount greater than the value of their homes – indeed, arson for profit is the leading cause of property loss, totaling millions of dollars in damage and investigation costs each year.”<sup>21</sup> My results suggest just the opposite is occurring. Adjusting the theoretical costs and benefits of these laws for how actors actually behave improves an insurance debate that has continued since the first of these laws was passed 140 years ago.<sup>22</sup>

But the implications are not confined to the question of how best to regulate the multi-billion dollar homeowners insurance market and its underwriting and loss settlement practices.<sup>23</sup> The results show the usefulness of casting moral hazard as a concept that focuses on more than just the hard economic factors that affect policyholders, as has traditionally been the case.<sup>24</sup> I find that the factors policyholders *believe*

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<sup>21</sup> PROP. CAS. INS. ASS’N OF AM., SPECIAL REPORT, THE COLORADO HOMEOWNERS INSURANCE MARKET: THE IMPACT OF NATURAL CATASTROPHES ON COSTS AND PREMIUMS 4 (2013), *available at* <http://www.dora.state.co.us/taskforce/Documents/SpecialRpt-PCI.pdf>.

<sup>22</sup> *See infra* Part II (discussing the origin of and debate over homeowners insurance valued policy laws).

<sup>23</sup> *See supra* note 1.

<sup>24</sup> Insurance theory and regulation has been greatly influenced by the neoclassical law and economics movement since at least Kenneth Arrow’s work on moral hazard in the 1960s. *See* Kenneth J. Arrow, *Uncertainty and the Welfare Economics of Medical Care*, 53 AM. ECON. REV. 94 (1963). Recent studies have shown that actual behavior does not always align with neoclassical economic predictions, but these insights have been slow to penetrate insurance regulation. Much of the most compelling work on the mismatch between classical economic predictions and actual behavior has been performed by insurance scholar Tom Baker. *See, e.g.*, Tom Baker & Peter Siegelman, “You Want

will affect their insurance payouts, rather than factors that truly determine them, are the factors that actually influence behavior. While this appears at first a deceptively simple point, it implies that, as I find, something that has no bearing on insurance loss settlement, like housing prices, will affect behavior, while other factors that actually affect insurance payouts, like valued policy laws, have little impact on policyholders' decisionmaking.

Moreover, traditional moral hazard models that focus exclusively on policyholder behavior ignore how other actors may respond in surprising ways. One explanation for the Article's surprising empirical findings is that *insurers* react to valued policy laws by altering their underwriting practices, which in turn reduces policyholders' loss incentives and loss rates. Models that focus exclusively on policyholder responses thereby miss the full panoply of interactions that result, which contribute to sharp divides between theoretical predictions and actual behavior.

By instead appreciating how economic and non-economic factors affect the behavior of a wide variety of actors, we can develop more reliable predictions of when moral hazard costs will be significant and how best to address those costs. Applying this approach to the case of homeowners insurance, I show that although the results differ markedly from traditional predictions, they are perfectly consistent with this broader conceptualization of moral hazard.

This Article proceeds in five Parts. Part I discusses the concept of moral hazard in the context of homeowners insurance. It identifies the conditions under which traditional economic theory predicts moral hazard will emerge in homeowners insurance markets, and it shows how insurers respond to mitigate these effects through contractual terms and pricing in standard homeowners insurance policies.

Insurers operate in a regulated environment, and state regulators restrict insurers' efforts to reduce moral hazard. Part II discusses one way: the "valued policy laws" that eighteen states have adopted and that form the basis for this Article's empirical analysis of moral hazard. These laws apply to residential fire losses, and they require insurers to overcompensate policyholders who buy insurance that exceeds the value of their home. I provide context for these laws, showing how they reintroduce moral hazard concerns and generate testable hypotheses that guide the later empirical analysis.

Parts III and IV provide the empirical analysis used to test these hypotheses. Part III describes the data used in the analysis. Part IV then proceeds to test for moral hazard in homeowners insurance in two independent ways. First, it tests whether loss rates from fire differ between states with and without valued policy laws, as well as whether

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*Insurance with That? Using Behavioral Economics to Protect Consumers from Add-on Insurance Products*, 20 CONN. INS. L.J. 1 (2013); TOM BAKER & SEAN GRIFFITH, ENSURING CORPORATE MISCONDUCT: HOW LIABILITY INSURANCE UNDERMINES SHAREHOLDER LITIGATION (2010); Tom Baker, *Blood Money, New Money and the Moral Economy of Tort Law in Action*, 35 L. & SOC'Y REV. 275 (2001).

other potentially relevant metrics, such as fluctuating home prices, could be driving losses. Next, it uses Louisiana's unexpected rollback of valued policy laws in 2008 as a quasi natural experiment to determine whether eliminating this moral hazard source impacts fire loss rates. The surprising results in each case show a complete lack of moral hazard in the manner that traditional economic models predict; fire loss rates are significantly *lower*, not higher, in states with valued policy laws that require potential policyholder overcompensation.

Finally, Part V evaluates the implications from these results. In addition to informing the debate on valued policy laws' costs and benefits, this study offers broader lessons for calibrating theoretical economic models to predict actual behavior with greater accuracy. I show how a reconceptualization of moral hazard as a phenomenon sensitive to both economic and noneconomic factors, as well as a phenomenon that influences the behavior of policyholders as well as other actors, will provide a much better match between theoretical predictions and empirical reality going forward.

## I. THE POTENTIAL FOR HOMEOWNERS INSURANCE MORAL HAZARD

The case for moral hazard in homeowners insurance hinges on an understanding of how insurance influences policyholders' behavior and how insurers respond to this influence. The following subparts analyze each in turn.

### A. Policyholders' Incentives

If they face the full consequences of their actions, rational individuals act only if that action's benefits exceed its costs.<sup>25</sup> However, when individuals externalize some or all of an action's negative consequences to others, destructive behavior can occur where the costs of that behavior

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<sup>25</sup> As studies have shown, individuals do not always behave in such a rational manner in insurance markets. See, e.g., Molk, *supra* note 6 (examining the apparent irrational refusal by policyholders to purchase flood insurance); Baker & Siegelman, *supra* note 24 (tackling the apparent irrationality of individuals' purchase of add-on insurance, such as collision damage waivers for rental cars); Robert Eisner & Robert H. Strotz, *Flight Insurance and the Theory of Choice*, 69 J. POL. ECON. 355, 355 (1961) (finding that policyholders purchase flight insurance at implausible markups from expected losses); *Unusual Insurance Policies*, GEICO (Sept. 29, 2014), <https://www.geico.com/more/saving/insurance-101/unusual-insurance-policies> (discussing the prevalence of alien abduction insurance). Nor are the apparent anomalies confined to insurance markets. See, e.g., DAN ARIELY, PREDICTABLY IRRATIONAL (2010) (providing an accessible summary of several apparent anomalies outside insurance). Nevertheless, standard moral hazard theory, as well as a multitude of studies, predict that individuals respond to changing economic incentives across a wide variety of circumstances. See, e.g., Arrow, *supra* note 24, at 961 (raising such a concern for homeowners insurance and fires).

exceed its benefits. This intuition, while not new, continues to be a key driver behind foundational areas of law and regulation.<sup>26</sup>

Moral hazard is a particular case of this general idea, originating in the context of insurance.<sup>27</sup> Insurance, by design, mitigates the negative consequences from certain policyholder losses, meaning that the costs of those losses are externalized to the insurance company. Moral hazard posits that individuals will respond to having insurance by engaging in riskier activities than they would otherwise, with more severe losses from those activities.<sup>28</sup> For example, an insured homeowner might decide not to purchase an alarm system for her house, leaving the home more open to theft or fire losses and increasing risk levels, because the insurer will cover burglary losses.

Of course, not all individuals act based on a careful calculation of the relevant financial costs and benefits. Some will be more influenced by a desire to conform to social expectations, or to do what is right or “moral;” indeed, the origins of the term moral hazard reflects insurers’ early recognition that some policyholders were more likely to take loss-preventative measures irrespective of financial consequences.<sup>29</sup> But financial consequences undoubtedly play a role in many people’s decisionmaking, and when insurance tilts that calculus more heavily in policyholders’ favor by mitigating or entirely eliminating financial costs, perverse consequences can result.

This observation raises the first instance where we can expect moral hazard to arise: when policyholders are financial profit maximizers, rather than motivated by nonfinancial considerations.<sup>30</sup> As an initial matter, we might therefore expect commercial insurance markets, whose

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<sup>26</sup> For example, large areas of land use law are derived from the need to adjust individual decisionmaking for the costs and benefits those decisions impose on society. *See, e.g.*, Robert C. Ellickson, *Alternatives to Zoning: Covenants, Nuisance Rules, and Fines as Land Use Controls*, 40 U. CHI. L. REV. 681 (1973); *see generally* Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713 (1996) (analyzing the use of law in controlling externalities in a variety of contexts).

<sup>27</sup> For more on the insurance origins of the term moral hazard, *see* Baker, *supra* note 7, at 250 – 60.

<sup>28</sup> *See generally* Steven Shavell, *On Moral Hazard and Insurance*, 92 Q.J. ECON. 541 (1979) (modeling policyholder and insurer reactions to moral hazard); Baker, *supra* note 7, at 279 (distinguishing between “ex ante” and “ex post” moral hazard).

<sup>29</sup> *Id.* at 250. Mutual insurers, whose policyholders are owners of the insurer, have been particularly adept at appealing to these individuals, since averted losses now also reduce premiums for the policyholder – and, perhaps more importantly, the policyholder’s neighbors. *See* Peter Molk, *The Puzzling Lack of Cooperatives*, 88 TUL. L. REV. 899, 920 – 21 (2014) (discussing the comparative advantages of mutual property insurers); Patrician Born et al., *Organizational Form and Insurance Company Performance: Stocks versus Mutuals*, in *THE ECONOMICS OF PROPERTY-CASUALTY INSURANCE* 167, 172, 191 (David F. Bradford ed., 1998) (discussing how mutual property insurers concentrate more on attracting low-risk policyholders than do other insurers); Molk, *supra* note 6, at 893 (finding policyholder-owned health insurers promise superior moral hazard reduction).

<sup>30</sup> Baker, *supra* note 7, at 277 (referring to “loss minimizers.”)

policyholders are business entities attuned to profit maximization, to be more prone to moral hazard than consumer insurance markets whose policyholders are individuals with non-financial motives.<sup>31</sup>

Being a profit maximizer encourages moral hazard; so too does the extent to which losses are externalized to the insurer, so the second factor that will influence moral hazard is the amount by which insurance payments offset losses. When policyholders bear an appreciable portion of a loss, their incentive to avoid a loss aligns with the insurers'. If, on the other extreme, a policyholder is actually *better off* should a loss occur, she has the incentive actively to seek these losses, against the insurer's interest. We might therefore expect moral hazard to be more problematic with automobile insurance if the insurer replaces a destroyed car with a brand new one (making the policyholder better off than before the loss) or nearly new one (making the policyholder close to whole) than if the insurer instead provides a payment far less than the destroyed car's worth.<sup>32</sup>

Even among financially motivated policyholders, however, moral hazard will be less of a problem if money is only an incomplete substitute for the loss that policyholders suffer, such as in the case of bodily harm. The third factor for moral hazard is therefore money's ability to substitute for the policyholder's loss.<sup>33</sup> If money poorly compensates policyholders for their loss, moral hazard concerns will be lower.<sup>34</sup> For example, it is not unreasonable to suppose that money can never fully compensate for the pain, suffering, emotional distress, and loss in enjoyment that death entails. We might therefore suppose moral hazard to be less important in life insurance than other areas.

Finally, moral hazard will be problematic when individuals have control over whether a loss occurs as well as the extent of the loss that results.<sup>35</sup> If a policyholder cannot make losses more likely or more severe regardless of her actions, then there is little worry that insurance will affect anything, and therefore little reason to worry about moral hazard. For example, individuals typically have little control over when or

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<sup>31</sup> Of course, not all businesses are motivated principally by profit maximization; nevertheless, this conception of large enterprise has been remarkably influential. Molk, *supra* note 29, at 944 (discussing the shareholder primacy model and its criticisms). Cf. ANDREW TOBIAS, *THE INVISIBLE BANKERS* 95 (1982) (asserting that one does not picture "large corporations" like "Corning Glass torching an outmoded facility to get the money to modernize," as opposed to individuals and small business policyholders.)

<sup>32</sup> The latter strategy has been long employed by automobile insurers, but insurers have recently begun offering the former coverage despite the moral hazard considerations. See, e.g., *New Car Replacement Coverage*, LIBERTY MUTUAL, <https://www.libertymutual.com/auto/car-insurance-coverage/new-car-replacement-insurance> (last visited April 16, 2016); *New Car Replacement Coverage and GAP Coverage*, AMERIPRISE, <https://www.ameriprise.com/auto-home-insurance/learning-center/insurance-tips-for-drivers/auto-insurance-coverage-made-simple/new-car-replacement-coverage-gap-coverage.asp> (last visited April 16, 2016).

<sup>33</sup> Baker, *supra* note 7, at 277 – 79.

<sup>34</sup> *Id.*

<sup>35</sup> *Id.* at 279 – 80.

whether they require emergency treatment; consequently, health insurance that covers only non-elective treatment costs would have little impact on loss rates and severity and exhibit little moral hazard.<sup>36</sup>

We can apply these factors to see if moral hazard presents theoretical concerns in homeowners insurance. The first factor – policyholders’ behavior as rational economic actors – weighs moderately in favor of moral hazard in homeowners insurance. Although by no means all individuals are motivated by financial considerations, financial incentives undoubtedly affect at least some homeowners’ decisions.<sup>37</sup> For example, homeowners evidence a greater willingness to engage in a strategic mortgage default when the financial rewards from doing so increase.<sup>38</sup> Further, state insurance fraud bureaus have reported increases in potentially fraudulent homeowners insurance claims when economic conditions worsen and the rewards from insurance fraud rises.<sup>39</sup> These suggest that at least some homeowners integrate financial considerations into their decisionmaking.

Homeowners also routinely have the bulk of their home losses covered by homeowners insurance,<sup>40</sup> so the second factor – the degree that insurance offsets losses – will also weigh in favor of moral hazard. If policyholders purchased enough coverage, their out of pocket expenses may total only several hundred dollars when their million dollar house is destroyed. The situation worsens when we consider that a house rebuilt from insurance payments may be worth considerably more than the pre-loss house;<sup>41</sup> the rebuilt house will have suffered no depreciation and can include the latest innovations unavailable at the time of original

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<sup>36</sup> Indeed, health insurance began as a product for exclusively these expenses because of moral hazard concerns if elective treatments were covered by insurance. ROBERT CUNNINGHAM III & ROBERT M. CUNNINGHAM JR., *THE BLUES: A HISTORY OF THE BLUE CROSS AND BLUE SHIELD SYSTEM* 6 (1997).

<sup>37</sup> For an early theorization of how economic incentives will drive behavior, see Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968). For discussion of the several studies applying this approach to the housing market, see Goebel & Harrison, *supra* note 20, at 50 – 52.

<sup>38</sup> Luigi Guiso, Paola Sapienza, & Luigi Zingales, *The Determinants of Attitudes Toward Strategic Default on Mortgages*, 68 J. FIN. 1473 (2013).

<sup>39</sup> E.g., Tony Pugh, *Recession is Fueling a Boom in Insurance Fraud*, MCCLATCHYDC, <http://www.mcclatchydc.com/news/nation-world/national/economy/article24576331.html> (March 11, 2010) (reporting results of a survey of state insurance fraud bureaus).

<sup>40</sup> See, e.g., Levon Barseghyan et al., *The Nature of Risk Preferences: Evidence from Insurance Choices*, 103 AM. ECON. REV. 2499, 2504 tbl. 2 (2013) (finding only 1.6% of households had insurance policies with deductibles exceeding \$1,000); *California Wildfires Highlight Need to Protect Against Underinsurance*, MARSHALL & SMITH, Aug. 17, 2009, <https://www.marshallswift.com/pressreleases.aspx?ReleaseID=15> (reporting results from survey that 64% of homes are “underinsured for insurance purposes,” with an average of 81% of replacement costs covered by insurance for these underinsured homes).

<sup>41</sup> The nature of the problem is the same, but the severity is less, when a house is only partially destroyed, as the homeowner then gains an upgrade only to that portion of the house.

construction.<sup>42</sup> But that is not the end of the story. If policyholders buy *more* insurance than the value of their home, they conceivably *directly profit* when the house is destroyed.<sup>43</sup> Since a home often constitutes the majority of individuals' net worth,<sup>44</sup> an ability to earn even a modest return on this asset through an overinsured loss may tempt the most moral among us.

The third factor influencing moral hazard – how well money compensates for the loss – also weighs moderately in favor of moral hazard's being a problem. For some individuals, money is unquestionably only an incomplete substitute for an insured home loss. Cash payments go only so far in offsetting the non-financial loss of security from knowing one's home has been burglarized or from watching one's family homestead go up in flames.<sup>45</sup> For these individuals, homeowners insurance presents little moral hazard concern. Others, however, view their homes more as an asset with little sentimental value,<sup>46</sup> and for these individuals, financial payments can be expected to provide a relatively complete substitute for the loss suffered by property destruction.

Finally, individuals have some, but by no means total, control over whether their homes experience a loss and the severity of that loss; consequently, the final factor of ability to control losses also weighs moderately in favor of moral hazard. For some losses, such as destruction by arson, policyholders may have direct control. For others, policyholders can increase the probability of a loss occurring even if they cannot directly cause a loss. Leaving one's front door open may increase the chance of a burglary, for example, while failing to keep a fire extinguisher in one's kitchen may increase the chance of severe fire losses.<sup>47</sup> But some losses

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<sup>42</sup> Even if the policyholder values the enhancements less than the market, policyholders can always sell the rebuilt house and use the proceeds to buy a depreciated house similar to the original home, profiting by the difference.

<sup>43</sup> As the next Subpart shows, insurers take significant steps to ensure this situation does not occur.

<sup>44</sup> *Net Worth and Asset Ownership of Households: 2011*, tbl. 1, CENSUS, [http://www.census.gov/people/wealth/files/Wealth\\_Tables\\_2011.xlsx](http://www.census.gov/people/wealth/files/Wealth_Tables_2011.xlsx) (finding median household has \$69,000 net worth, of which home equity accounts for 75%).

<sup>45</sup> See Baker, *supra* note 7, at 278 (“[M]oney cannot restore the sense of security lost when a storm destroys a home or when a thief breaks in.”)

<sup>46</sup> We might expect these individuals to be recent purchasers of homes, as opposed to those who have occupied the same place for decades. See generally Brenda Swanson, *This MBA Chart Shows Existing Home Turnover*, HOUSINGWIRE, June 26, 2015, <http://www.housingwire.com/articles/34324-this-mba-chart-shows-existing-home-turnover> (quoting the Mortgage Bankers Association as saying that normal housing turnover “is about 7.5%.”) Even these individuals might experience some emotional attachment, but presumably less than long-time residents. See generally Samantha Sharf, *10 Mistakes Even Savvy Stock Investors Make*, FORBES, Oct. 10, 2013, <http://www.forbes.com/sites/samanthasharf/2013/10/10/10-mistakes-even-savvy-stock-investors-make> (referring to the “emotional attachments” that some investors experience with certain financial assets, like stocks).

<sup>47</sup> *Ten Ways to Avoid a Kitchen Fire*, RED CROSS, Feb. 4, 2014, <http://www.redcross.org/news/article/Avoid-Kitchen-Fires-Use-Red-Cross-Tips>

appear completely outside policyholders' control, such as destruction by natural hazards, and present little moral hazard risk.<sup>48</sup>

Pulling these factors together, we see a reasonable theoretical case for homeowners insurance moral hazard emerging. Two factors weigh strongly in favor of moral hazard problems; two others weigh in favor, but less so.

Unsurprisingly, insurers have long recognized this residential moral hazard potential.<sup>49</sup> Indeed, it has even spawned popular jokes on the subject.<sup>50</sup> And having recognized the problem, homeowners insurers take a number of steps to mitigate it.

## B. *Insurers' Contract Response*

Standard homeowners insurance contracts take two general approaches in limiting policyholder moral hazard.<sup>51</sup> The first restricts policyholder behavior, while the second modifies policyholders' economic incentives.

### 1. Restricting Policyholder Behavior

Under this first approach, homeowners insurers refuse to pay policyholders who engage in behavior indicative of certain moral hazard situations. The contractual prohibitions take a variety of forms. Most directly on point for the later analysis, insurers refuse to pay a policyholder for losses that the policyholder causes intentionally.<sup>52</sup> If a policyholder burns down her overinsured house to collect the insurance proceeds, insurers have no legal obligation to pay, addressing the most egregious form of moral hazard.

Beyond intentional losses, moral hazard can manifest through failing to take adequate measures to prevent losses – such as the homeowner who

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<sup>48</sup> Even for these losses, however, homeowners typically have some limited control over whether a loss occurs by choosing to live in an area subject to natural disasters. *See generally* Molk, *supra* note 6 (discussing this limited measure of control over natural disaster losses).

<sup>49</sup> *See, e.g.,* George W. Goble, *The Moral Hazard Clauses of the Standard Fire Insurance Policy*, 37 COLUM. L. REV. 410 (1937) (recounting early collective effort by insurers to design standard homeowners policy that addressed policyholder moral hazard potential).

<sup>50</sup> *See* TOBIAS, *supra* note 31, at 108:

These two older fellas are walking down the beach in Miami. "My factory burned down," says the first, "and I retired on the insurance."

"That's funny," says the second. "My factory got washed away in a flood, and I retired on the insurance, too!"

"Really?" asks the first, incredulous – "How do you start a flood?"

<sup>51</sup> Homeowners insurance is overwhelmingly written using collectively drafted standardized forms that do not vary across insurance companies. For a study on the degree of this standardization and the areas in which insurers differ, *see* Daniel Schwarcz, *Reevaluating Standardized Insurance Policies*, 78 U. CHI. L. REV. 1263 (2011). For a current version of the standard form contract, *see* INSURANCE SERVICES OFFICE, HOMEOWNERS 3 – SPECIAL FORM ("HO3 POLICY"), *reprinted in* KENNETH S. ABRAHAM & DANIEL SCHWARCZ, *INSURANCE LAW AND REGULATION* 185–209 (6th ed. 2015).

<sup>52</sup> HO3 SAMPLE POLICY, *supra* note 51, at p.13 § A(8)

does not replace the dead battery in a smoke detector, or who stores gasoline near the gas heater. Insurers cannot refuse to pay in all these circumstances without gutting policies of their value to policyholders.<sup>53</sup> Instead, insurers adopt exclusions that prevent payment for particular enumerated actions that are typically a product of moral hazard. Losses including gradual structural collapse, damage from frozen water pipes, thefts from a long-vacant home, and bird, insect, and rodent damage are all excluded.<sup>54</sup> Minimal intervention by policyholders can prevent most or all of these losses; making policyholders liable for these losses encourages some care that rational moral hazard would otherwise leave lacking.

Yet these contractual terms are only an incomplete solution to the moral hazard concern. Some policyholders might cause intentional losses but still recover from the insurer, since intent can be difficult to prove. For others, the enumerated list of exclusions will not deter behavior coincident with moral hazard. Failure to replace batteries in a smoke detector does not jeopardize coverage, for example, nor does failure to lock the front door, stock fire extinguishers, or a host of other activity predicted by moral hazard theory. In other words, the potential for moral hazard remains.

Employing contractual terms that manage policyholder behavior is not the only way that insurers address the problem. I next consider the ways that insurers align policyholders' economic incentives with insurers' and society's.

## 2. Modifying Economic Incentives

Insurers adopt three approaches to push policyholders' cost-benefit analysis away from policyholder-centered decisionmaking that externalizes costs to others, and towards decisions that align with insurers' and society's interests. The first is attached as a condition to homeowners insurance and is known as the insurable interest requirement. This provision requires the policyholder to have a financial stake at risk to be able to buy insurance, and limits the amount of insurance available to the size of that stake.<sup>55</sup> The insurable interest requirement means that even if a policyholder obtains insurance with a maximum payment exceeding the value of the underlying house, the insurance company pays at most the amount needed to replace the house.<sup>56</sup>

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<sup>53</sup> Balancing prevention of moral hazard against covering ordinary negligence is a difficult one for insurers to strike. *See generally* Daniel Schwarcz, *Coverage Information in Insurance Law*, 101 MINN. L. REV. 1457, 1497–98 (2017) (discussing the lack of increase-in-hazard clauses in homeowners insurance).

<sup>54</sup> HO3 SAMPLE POLICY, *supra* note 51, at p. 9 § A(c)(1), (2), (3), (4), (6)(g).

<sup>55</sup> *See, e.g.*, *Gossett v. Farmers Ins. Co.*, 948 P.2d 1264, 1271–72 (Wash. 1997); Kenneth S. Abraham & Kyle D. Logue, *The Genie and the Bottle: Collateral Sources under the September 11th Victim Compensation Fund*, 53 DEPAUL L. REV. 591, 608 (2003).

<sup>56</sup> HO3 SAMPLE POLICY, *supra* note 51, at p.13 § A, p.14 § D. Homeowners insurance provides for either the amount the destroyed property was worth (“actual cash value”), or, more commonly, the amount needed to replace the destroyed property (“replacement

The insurable interest requirement is an effective means of deterring many manifestations of moral hazard. Even if a policyholder obtains insurance with a face value several multiples above a house's value, the condition limits the policyholder's recovery to the amount needed to replace the destroyed structure.<sup>57</sup> A homeowner with a \$100,000 house, for example, will be paid only \$100,000 from an insurer even if she obtained \$1 million in property coverage. Properly applied, the insurable interest requirement therefore transforms the insurance policy from a promise to pay the insurance policy's face value into a promise to pay the lesser of the policy face value *or* the amount needed to replace the destroyed property. Thus, even if a policyholder disguises an intentional loss as a non-intentional one, or even if a policyholder intentionally increases the probability of a loss occurring by leaving the front door unlocked, the insurable interest requirement limits her recovery to keep moral hazard considerations in check.<sup>58</sup>

The second way insurers affect homeowners' cost-benefit calculation is to impose deductibles that require policyholders to bear some of the loss alongside the insurer. These deductibles typically are a fixed dollar amount,<sup>59</sup> on the order of \$500 or \$1,000,<sup>60</sup> and require the policyholder to

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cost"). See HO3 SAMPLE POLICY, *supra* note 51, at p.14 § D (providing default payment for damage to the home as replacement cost); TOM BAKER & KYLE D. LOGUE, INSURANCE LAW AND POLICY 179 (3d ed. 2013) (referring to the "overwhelming success" of replacement cost policies); Schwarcz, *supra* note 51, at 1317 n. 196 (noting that mortgage companies require homeowners to have insurance with replacement cost coverage); see generally Johnny Parker, *Replacement Cost Coverage: A Legal Primer*, 34 WAKE FOREST L. REV. 295 (1999) (discussing the difference between replacement cost and actual cash value coverages).

<sup>57</sup> HO3 SAMPLE POLICY, *supra* note 51, at p.14 § D.

<sup>58</sup> Actual cash value payments completely eliminate policyholders' ability to profit from a loss, and therefore may provide the best deterrent against moral hazard. Replacement cost coverage, however, potentially make policyholders better off after a loss by paying the value of a *new* house for the loss of an *old*, less valuable house. Homeowners suffering a total loss, for example, receive from the insurer the amount needed to replace their depreciated, worn house with a new one, potentially profiting from the loss by the amount of depreciation. Robust demand by homeowners has spurred the growth in these "replacement cost" policies despite the moral hazard concerns – after all, homeowners are unable to replace a depreciated home with the depreciated components for which traditional actual cash value policies would pay. Insurers also require policyholders to use a replacement cost payment to replace the house, which prevents policyholders from pocketing a supra-compensatory replacement cost payment, presumably hoping that policyholders will be less likely to cause losses insured for replacement cost if the insurance money must be reinvested into the house. BAKER & LOGUE, *supra* note 56, at 179. Despite these efforts, replacement cost policies still introduce some moral hazard potential, as policyholders are left with a new, more valuable home for them to enjoy or monetize by selling. These moral hazard concerns fall outside the scope of those tested in this Article.

<sup>59</sup> For specific hurricane or windstorm losses, insurers frequently adopt percentage deductibles, requiring policyholders to bear a fixed percentage of losses (typically 1% to 5%) rather than a fixed dollar amount of losses. See, e.g., *Hurricane and Windstorm Deductibles*, INSURANCE INFORMATION INSTITUTE, June 2015, <http://www.iii.org/issue-update/hurricane-and-windstorm-deductibles>. The traditional justification for these

pay the deductible amount before the insurer covers any portion of a loss.<sup>61</sup> The theory of cost-sharing devices like deductibles is that by requiring policyholders to bear some of a loss, policyholders will have a financial incentive to prevent the loss from happening, or to mitigate the loss's severity.<sup>62</sup> Yet because the ratio of a \$500 or \$1,000 deductible to a total home loss is so small, this financial incentive encourages meaningful loss prevention only for the smallest of losses, leaving many instances of moral hazard unaddressed.

The final way that insurers alter policyholders' financial calculations occurs not through the homeowners insurance contract directly, but rather through how these policies are priced. Homeowners insurance, like most forms of insurance, is experience rated: individuals with no history of prior losses pay less for insurance than comparable individuals with recent losses.<sup>63</sup> Premium increases following a loss indirectly discourage policyholder moral hazard, by making it more costly for a policyholder to have a loss.<sup>64</sup> For this system to be an effective deterrent, policyholders must know that prices will increase following a claimed loss; policyholders must still want to buy homeowners insurance after the price increase; and the price increase following a loss must be significant. Evidence suggests that these conditions are met with mixed success.<sup>65</sup>

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percentage deductibles is that it eases insurers' burden in covering correlated losses, which otherwise can be difficult for insurers to manage. *Id.*; see Molk, *supra* note 6 (critiquing this argument).

<sup>60</sup> Barseghyan, *supra* note 40.

<sup>61</sup> A few specifically enumerated small loss items are covered by homeowners insurers with no deductible. See, e.g., HO3 SAMPLE POLICY, *supra* note 51, at p. 6–7 §§ E(4), E(6) (fire department service charge; credit card, electronic fund transfer card or access device, forgery and counterfeit money).

<sup>62</sup> See generally Molk, *supra* note 6 (discussing the loss-avoidance signals sent by insurance premiums).

<sup>63</sup> E.g., KENNETH S. ABRAHAM, DISTRIBUTING RISK: INSURANCE, LEGAL THEORY, AND PUBLIC POLICY 72–74 (1986). Insurers facilitate this pricing system through the use of a communal nationwide database, known as the Comprehensive Loss Underwriting Exchange, that provides a history of policyholders' claims against their homeowners insurer. *Personal Reports*, LEXISNEXIS, [https://personalreports.lexisnexis.com/fact\\_act\\_disclosure.jsp](https://personalreports.lexisnexis.com/fact_act_disclosure.jsp) (last visited May 1, 2017). In the commercial context, where the stakes are much larger, insurers may go beyond simple experience rating and base premiums on more individualized factors, and they may also provide individualized loss-avoidance advice. See generally Victor P. Goldberg, *Tort Liability for Negligent Inspection by Insurers*, in RESEARCH IN LAW AND ECONOMICS (Richard O. Zerbe, Jr. ed., 1980) (exploring implications in commercial markets for liability for this advice). The smaller size of most residential policies makes these features very rare in homeowners insurance markets.

<sup>64</sup> In this way, future premium increases act much like deductibles and other cost-sharing techniques, with the policyholder sharing the loss by paying higher future insurance premiums.

<sup>65</sup> Although price increases after a loss can be significant, and although policyholders may want to continue purchasing homeowners insurance after a loss (or be required to do so by their mortgage company), many policyholders appear unaware that claims against their insurer will result in premium increases. See, e.g., Alina Tugend, *The Peace of Mind of Home Insurance, Unless You Use It*, N.Y. TIMES, Oct. 1, 2005,

### 3. Residual Moral Hazard

As the prior Subpart has shown, insurers reduce moral hazard in homeowners insurance by aligning policyholders' incentives with insurers' through several contractual mechanisms. These efforts, however, are incomplete. Worse yet, insurers operate in a heavily regulated arena, and not all regulators allow insurers unfettered access to these moral hazard reduction efforts. In particular, regulators in eighteen states restrict insurers' use of the insurable interest requirement because of perceived policyholder unfairness that can result, rekindling moral hazard worries. The next Part introduces this regulatory limitation, which forms the backbone of the empirical tests for moral hazard that I conduct.

## II. REINTRODUCING MORAL HAZARD: VALUED POLICY LAWS

Recall that under standard homeowners insurance, insurers agree to pay policyholders the lesser of the maximum face value of insurance in the policy, or the cost to replace the property (or less commonly, the value of the property – for purposes of this Article, this distinction is unimportant). Therefore, if an insurer issues a policy with a \$100,000 limit for a house that costs only \$50,000 to replace, the insurer pays only \$50,000 when that house is completely destroyed. This insurable interest requirement is a significant check on moral hazard.

Yet even though this provision mitigates moral hazard, it strikes many as unfair by seemingly allowing insurers to collect premiums from policyholders on excess insurance that policyholders will never use.<sup>66</sup> Eighteen states have responded by implementing “valued policy laws.”<sup>67</sup> Although there are some minor variations, at their core these laws require insurers to pay homeowners the full insurance policy limit whenever a home is completely destroyed by fire, and sometimes by other causes.<sup>68</sup> In the example above, therefore, a policyholder with a \$100,000 home insurance policy limit would collect \$100,000 from the insurance company subject to a valued policy law, even if the destroyed house was worth only \$50,000.

It should be readily apparent that valued policy laws can encourage moral hazard, because they make it possible for policyholders to profit

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[http://www.nytimes.com/2005/10/01/business/the-peace-of-mind-of-home-insurance-unless-you-use-it.html?\\_r=0](http://www.nytimes.com/2005/10/01/business/the-peace-of-mind-of-home-insurance-unless-you-use-it.html?_r=0).

<sup>66</sup> See, e.g., *Tedford v. Sec. State Fire Ins. Co.*, 278 S.W.2d 89, 91 (Ark. 1955).

<sup>67</sup> See generally JEFFREY W. STEMPER & ERIK S. KNUTSEN, STEMPER AND KNUTSEN ON INSURANCE COVERAGE § 15.04[B], at 15-73 – 15-74 (4th ed. 2016) (identifying 20 states with valued policy laws). I excluded two of these states from having valued policy laws: California, whose valued policy law applies only to certain personal objects inside the dwelling, and to the structure only upon payment of an additional fee by the policyholder, see CAL. INS. CODE §§ 381.2, 2051–2052, 2054; and Louisiana, whose valued policy law no longer applies to homeowners insurance, for reasons discussed fully *infra* Part IV.B.

<sup>68</sup> See, e.g., KAN. STAT. ANN. § 40-905 (requiring payment of policy limits for total losses from fire, tornadoes, windstorms, and lightning); MONT. CODE ANN. §§ 33-24-102 to -103 (extending valued policy law to specifically-valued personal property as well).

substantially from losses. Although fraud and intentional property destruction still forfeit insurance coverage even with a valued policy law,<sup>69</sup> nothing prohibits policyholders from “encouraging” a loss through storing flammable material on-site or similar means,<sup>70</sup> and intentional losses that go undetected or unproven by insurers must also be compensated in accordance with valued policy laws.<sup>71</sup>

Unsurprisingly, insurers have pushed back against these laws since they were first adopted in 1874.<sup>72</sup> New Hampshire homeowners insurers refused to issue policies in the state for five years after the state adopted a valued policy law in 1885.<sup>73</sup> Insurers even unsuccessfully challenged valued policy laws’ legality before the United States Supreme Court in 1899.<sup>74</sup> They have appealed to public opinion, characterizing the laws as “an incentive to crime . . . offer[ing] to the morally weak a temptation to commit the crime of arson for money”<sup>75</sup> and as “an invitation to and a statutory reward for arson.”<sup>76</sup> Critics were not confined to insurers; the Ohio Superintendent of Insurance cast the effects of his state’s valued policy law in the following negative light:

[It] convert[s] the whole scheme of insurance into a money-making and gambling transaction. It is a statute that may make it more profitable to destroy property than to keep it. It is a statute that places before every evil-disposed person the temptation to over-insure and then burn his property for the gain there is in it. And even where the assured is honest he is liable to be made more indifferent as to the care he should take of his property by over-insurance.<sup>77</sup>

<sup>69</sup> See, e.g., GA. CODE. ANN. § 33-32-5 (applying valued policy law in the absence of fraud or criminal fault).

<sup>70</sup> See *supra* notes 52–54 and accompanying text.

<sup>71</sup> See, e.g., Wisconsin Insurance Alliance, *Position Paper* (May 12, 1977) (quoted in *Seider v. O’Connell*, 612 N.W.2d 659, 673 n.8) (asserting that “[a]rson is difficult to detect and hard to prove because ‘torch men’ are frequently used by arson-inclined insured.”)

<sup>72</sup> See, e.g., *Seider*, 612 N.W.2d at 671. An in-depth history of Wisconsin’s valued policy law is contained in SPENCER L. KIMBALL, *INSURANCE AND PUBLIC POLICY* 240-49 (1960).

<sup>73</sup> *The Valued Policy Law: Home View of the New-Hampshire Fire Insurance Law*, N.Y. TIMES, Sept. 13, 1885 (quoting PORTSMOUTH TIMES (New Hampshire), Sept. 11, 1885); HAYDEN’S ANNUAL CYCLOPEDIA OF INSURANCE IN THE UNITED STATES 1899–1900 618 (1900).

<sup>74</sup> *Orient Ins. Co. v. Daggs*, 172 U.S. 557 (1899). The laws were challenged under a theory of violating insurers’ fundamental right to make contracts of insurance, which hinged on promoting the insurable interest requirement violated by valued policy laws. *Id.*

<sup>75</sup> HAYDEN’S ANNUAL CYCLOPEDIA OF INSURANCE IN THE UNITED STATES, *supra* note 73, at 338.

<sup>76</sup> Wisconsin Insurance Alliance, *Position Paper* (May 12, 1977) (quoted in *Seider*, 612 N.W.2d at 673 n.8).

<sup>77</sup> HAYDEN’S ANNUAL CYCLOPEDIA OF INSURANCE IN THE UNITED STATES, *supra* note 73, at 445.

These arguments continue in the present day. For example, in 2013, the Property Casualty Insurers Association of America characterized valued policy laws as “not sound policy” that would “result in higher total costs that are likely passed on to all policyholders,” while stating that these laws may lead people to “deliberately set their houses on fire just to get an amount greater than the value of their homes.”<sup>78</sup> Nor is the source of recent criticism confined to insurers: academics generally disparage valued policy laws as well, concluding that their adverse impacts on moral hazard more than offset any potential benefits to policyholders.<sup>79</sup>

Proponents do not deny the laws’ potential to generate moral hazard, but they point to two principal benefits. First, the laws deter insurers from collecting high premiums based on an inflated policy face value and later opportunistically paying policyholders the lesser value of the house after a loss.<sup>80</sup> Because valued policies force insurers to pay full policy face value for a total loss, proponents characterize them as furthering principles of fairness while promoting more accurate underwriting by insurers.<sup>81</sup> Second, valued policy laws reduce disputes over the value of destroyed property after a loss occurs.<sup>82</sup> Because the insurer must pay the face value of an insurance policy for a total loss, the policyholder and insurer need not argue over the replacement cost or value of destroyed property after a loss happens; all that matters is the amount of insurance that was purchased. For policies in other states, however, the insurer pays the lesser of replacement cost and the policy’s maximum limit, requiring the insurer and policyholder to agree over what this replacement cost is.<sup>83</sup>

<sup>78</sup> SPECIAL REPORT, *supra* note 21, at 1, 5.

<sup>79</sup> ROBERT E. KEETON, BASIC TEXT ON INSURANCE LAW 142 (1971) (concluding that “[o]n balance, the principle of indemnity would be better served by repeal of valued policy statutes”); ROBERT H. JERRY, II & DOUGLAS R. RICHMOND, UNDERSTANDING INSURANCE LAW § 93[c], at 633 (5th ed. 2012) (noting that it is “likely that valued policies increase moral hazard” and that “it is very possible that the public would be better served if valued policy statutes were repealed”); KENNETH S. ABRAHAM, INSURANCE LAW AND REGULATION 272 (5th ed. 2010) (asserting that “the use of valued policies seems likely to cost more by way of increased moral hazard than it saves”); *but see* STEMPEL & KNUTSEN, *supra* note 67, § 15.04[B], at 15-76, 15-79, 15-81 (acknowledging “at least the theoretical danger that valued policies will overcompensate policyholders” but cautioning that the moral hazard concern is tempered by unreimbursed losses coinciding with home destruction, such as emotional losses or the time spent dealing with insurers before concluding that “[v]alued policy laws make sense on fairness, efficiency, and consumer protection grounds”).

<sup>80</sup> *See, e.g.*, *Gambrell v. Campbellsport Mut. Ins. Co.*, 177 N.W.2d 313, 315 (Wis. 1970).

<sup>81</sup> *Id.*

<sup>82</sup> *See, e.g.*, *Musselman v. Mountain W. Farm Bureau Mut. Ins. Co.*, 824 P.2d 271, 274 (Mont. 1992).

<sup>83</sup> *See id.* Some of this savings by valued policy laws is undermined by a shifting of disputes into whether a loss is a “total loss,” rather than disputes over the replacement cost of that loss. *See, e.g.*, *Wickman v. State Farm Fire & Cas. Co.*, 616 F. Supp. 2d 909, 716–17 (E.D. Wis. 2009) (involving a dispute over whether a damaged home was a total loss, triggering the state’s valued policy law); *Auto-Owners Ins. Co. v. Second Chance Investments, LLC*, 827 N.W.2d 766 (Minn. 2013) (refusing to allow insurer to have an appraisal panel determine whether a loss was a total loss). The characterization of a loss

When that property no longer exists, this agreement can be difficult to achieve.<sup>84</sup>

Whatever valued policy laws' virtues, their main criticism is that they result in greater moral hazard among rational policyholders as a matter of economic theory. Because valued policyholders receive at least as much insurance compensation as analogous traditional policies, their financial incentive to prevent losses will be *at most* equal to that of traditional policyholders. In egregious cases when the amount of insurance significantly exceeds property values, valued policyholders will have the financial incentive to *encourage* losses. It is not difficult to find real life instances where this occurs. Recent examples include an \$86,000 insurance payment for \$54,000 in replacement cost damage,<sup>85</sup> \$80,000 in insurance proceeds for a \$25,000 actual cash value loss,<sup>86</sup> and \$2,100,500 from an insurer for \$1,750,000 in replacement cost damage.<sup>87</sup>

The extent to which policyholders respond to these moral hazard incentives and translate theoretical worries in actual problems is unknown. Although insurers and academics generally criticize valued policy laws for inducing moral hazard and increasing fire rates, the criticism is supported principally by theoretical assumptions of how individuals rationally respond to financial incentives. Yet there are many reasons to doubt whether policyholders will respond to valued policy laws' financial incentives by increasing fire loss rates. For one, policyholder understanding of insurance agreements is notoriously poor,<sup>88</sup> and if policyholders do not appreciate the difference between traditional insurance reimbursement and that required by valued policy laws, the laws may have little impact on policyholder behavior. For another, individuals have been observed to disregard rational economic incentives, not only in insurance markets<sup>89</sup> but also across a variety of other situations.<sup>90</sup> Layered on top of this is the only moderate moral hazard picture we saw earlier when applying general theory principles.

I seek to answer this issue by testing whether valued policy laws are associated with higher fire loss rates among insured homeowners. Fire

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as total versus partial matters only for whether valued policy laws apply, and is therefore not an issue in non-valued policy law states.

<sup>84</sup> See, e.g., *Tedford*, 278 S.W.2d at 91.

<sup>85</sup> *Cambier v. Integrity Mut. Ins. Co.*, 738 N.W.2d 181 (Wis. Ct. App. 2007). The appellate court overturned a trial court entry of summary judgment for the policyholder because it found the policyholder's property was used as rental property, rather than a personal residence.

<sup>86</sup> *Johnson v. Mt. Morris Mut. Ins. Co.*, 809 N.W.2d 53 (Wis. Ct. App. 2011).

<sup>87</sup> *Second Chance Investments*, 827 N.W.2d 766.

<sup>88</sup> See, e.g., Schwarcz, *supra* note 51, at 1326 (asserting that "even motivated consumers are ill-equipped to comprehend the meaning of typical homeowners policies, which are, in many ways, uniquely impenetrable.")

<sup>89</sup> See *supra* note 25.

<sup>90</sup> ARIELY, *supra* note 25; see generally Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1998) (discussing several behavioral anomalies).

rates were chosen for two reasons. First, fire is the only cause of loss that is covered by all states' valued policy laws.<sup>91</sup> Some, but not all, states require additional sources to be covered as well. Second, fire losses are frequently identified as indicative of moral hazard;<sup>92</sup> fires of course can be started intentionally for the purpose of insurance fraud,<sup>93</sup> but even many non-intentional fires can be prevented with appropriate care. Finally, valued policy laws require total losses, and fire is the only loss source included in the data that conceivably can produce a total loss.

This test for moral hazard also yields several side benefits beyond an analysis of valued policy laws' effect, by analyzing additional factors that influence fire claim rates. Policyholders may incorporate a variety of other information into their fire-prevention decisions, some of which might be predicted by standard economic theory, and some of which should have little relevance. For instance, popular wisdom predicts that falling home prices will make policyholders more likely to have an insured fire loss to capitalize on their perceived overinsurance, despite the fact that popularized home prices play no role in the amount that insurers pay for a loss.<sup>94</sup> By incorporating information on recent home prices into the analysis, we can determine whether policyholders respond to these indicators that should not affect their decisionmaking, and therefore obtain a better sense for how individuals make decisions.

The next Part discusses the data used for the empirical analysis.

### III. TESTING MORAL HAZARD: THE DATA

The principal data for this project originate from a proprietary insurer database of 4.1 million residential homeowners insurance claims from 2002 – 2011. Insurance organizations voluntarily file claims in the database to investigate policyholders' loss histories and identify suspect

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<sup>91</sup> *E.g.*, STEMPEL AND KNUTSEN, *supra* note 67, § 15.04[B] at 15-74. Some, but not all, states require additional sources to be covered as well. However, none of the valued policy laws apply to any other loss source in the data. The reason for many states' valued policy law limitation to fire losses appears to be because many of these laws were originally passed when homeowners insurance covered exclusively fire losses. Homeowners policies have since expanded to cover a variety of loss sources. For more on this distinction, see *infra* notes 123–125 and accompanying text.

<sup>92</sup> *E.g.*, Eriksen & Carson, *supra* note 20, at 12.

<sup>93</sup> The scope of these intentional fire losses, while difficult to estimate, appears significant. *See, e.g.*, RICHARD CAMPBELL, NAT'L FIRE PROTECTION ASSOCIATION, INTENTIONAL FIRES (2014), <http://www.nfpa.org/~media/files/research/nfpa-reports/major-causes/osintentional.pdf?la=en> (estimating approximately 50,000 intentional property fires and \$1.3 billion in associated property damage annually); NAT'L INS. CRIME BUREAU, INSURANCE FRAUD: UNDERSTANDING THE BASICS, <https://www.nicb.org/File%20Library/Theft%20and%20Fraud%20Prevention/Fact%20Sheets/Public/insurancefraudpublic.pdf> (last visited May 11, 2016) (estimating at least 10% of property/casualty insurance claims to be fraudulent); Pugh, *supra* note 39 (63% of state insurance fraud bureaus report an increase in home arsons during most recent recession).

<sup>94</sup> *E.g.*, Eriksen & Carson, *supra* note 20.

claims. Because insurers' decision to participate is voluntary, as is their decision regarding whether to provide some or all their claims made, the dataset does not cover all insurance claims across the country. Nevertheless, it has achieved considerable success in participation rates, including participation (in one form or another) by insurers representing 99% of the property/casualty industry by premium volume.

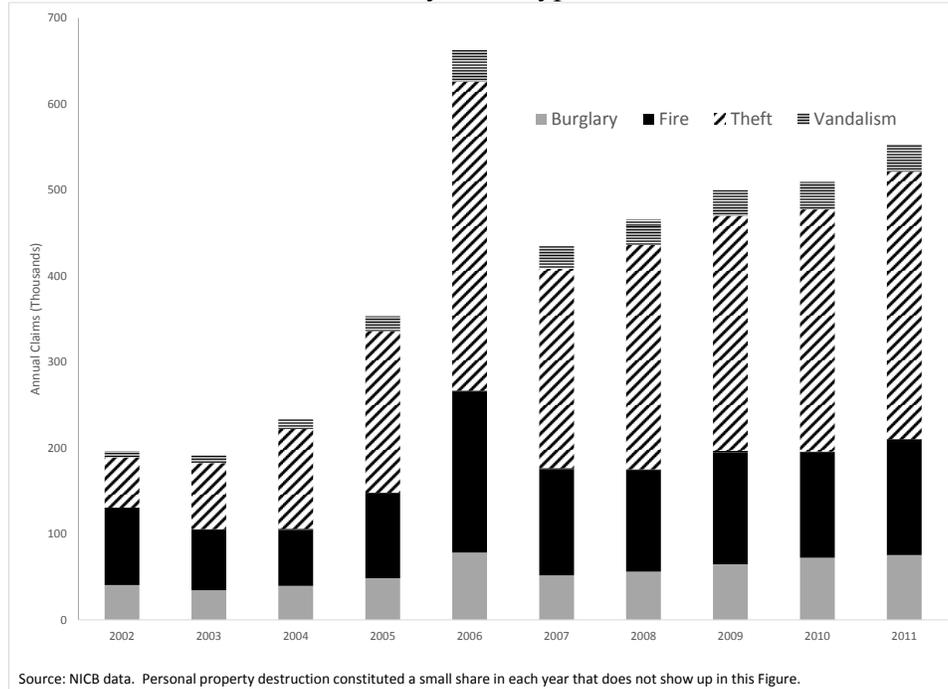
Each claim in the dataset contains the date of the underlying loss, the state in which the loss occurred, and the source of the loss. Claims in the database stemmed from the following five causes of loss: burglary, fire or smoke damage, personal property destruction, theft, and vandalism and malicious mischief.<sup>95</sup> Claims from other causes of loss, such as water or wind damage, were not provided in the dataset. No other information, such as the street address or city of the loss or the loss amount, was reliably or consistently included in the dataset.

The claim data covered all fifty states for the period 2002 through 2011. Figure 1 depicts their composition by loss type.

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<sup>95</sup> Fire damage and smoke damage are two separate causes in the dataset, but they were grouped together in my analysis to identify claims based directly (fire) and indirectly (smoke) on fire damage.

Figure 1  
Claims by Loss Type and Year



I augmented each claim in the claim dataset with several additional indicators that affect or are believed to affect policyholder moral hazard. These indicators can be divided into economic indicators and non-economic indicators.

#### A. Additional Economic Indicators

Several economic indicators are thought to impact policyholders' decisionmaking and contribute to moral hazard. Foremost among these are home values. It is frequently thought that when the difference grows between falling property values and the constant face value of a homeowners insurance policy, collecting from one's insurance becomes more profitable.<sup>96</sup> I therefore included state-level data on changes in home prices as tracked by the Federal Housing Finance Agency.<sup>97</sup>

Despite popular focus on home prices as a driver of moral hazard, fluctuating home prices actually play no role in how much an insurer pays, and they should therefore play little role in the rational policyholder's

<sup>96</sup> This view is widely shared. See, e.g., TOBIAS, *supra* note 31, at 107 (suggesting a money-making opportunity by burning down overinsured homes).

<sup>97</sup> *House Price Index Datasets*, FEDERAL HOUSING FINANCE AGENCY, <http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx> (last visited May 8, 2016). Prices were not adjusted for seasonality. The Agency provides the price index quarterly; this index was converted into a monthly number assuming linear monthly changes from one quarter to the next. State-level figures, rather than more local data, were used to match the claims data, which were provided only on a state-level basis.

decisionmaking.<sup>98</sup> Although the point is often overlooked, home price numbers include not just the value of the dwelling, which is insured, but also the value of the land on which that dwelling sits, the right to build on that land, and a variety of other factors.<sup>99</sup> None of these other factors is insured.<sup>100</sup> And fundamentally, the value of a dwelling – again, the component of the popular housing price figure that is insured – remains relatively constant, because it is determined simply by construction costs and depreciation,<sup>101</sup> which are largely stable over time.<sup>102</sup> Most of the popularized gyrations in housing market prices are not changes in the insured value of the house itself, but instead are capitalized into the non-insured value of the land, the right to build, or other noninsured factors.<sup>103</sup> A significant relationship between claims behavior and housing practices would therefore represent an interesting, and unexpected, source of moral hazard.

I also included data on housing construction costs. Since insurance covers the value of the housing structure, which is based on housing construction costs, changes in these costs will affect insurance payments and may therefore factor into policyholders' decisionmaking. To incorporate this information, I used percentage changes in two construction cost indices published by Engineering News-Record, the only

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<sup>98</sup> Some have argued that gaps between recently-declined housing prices and stable insurance values will encourage fire rates as policyholders “sell” their homes to the insurer at the inflated insurance amount. *See, e.g.,* Goebel & Harrison, *supra* note 20, at 49 – 50; Eriksen & Carson, *supra* note 20. However, standard insurance contracts offer higher replacement coverage only if the policyholder actually replaces her property (precluding a “sale” to the insurer); the insurance contract reserves the right to pay lesser actual cash values if the property is not replaced. HO3 SAMPLE POLICY, *supra* note 51, at p.12 § D(2)(d); ABRAHAM & SCHWARCZ, *supra* note 51, at 263 – 64

<sup>99</sup> These factors include information ranging from the quality of a public school district, to local crime rates, to the availability of comparable houses, among a host of others. *See, e.g., Replacement Cost vs. Market Value*, STATE FARM, Mar. 3, 2011, <https://learningcenter.statefarm.com/insurance/home/replacement-cost-vs-market-value>.

<sup>100</sup> *See, e.g., id.* (contrasting the popular “market value” figure with the replacement cost figure that insurers cover); *Reconstruction Costs, not Market Value, Key to Homeowners Insurance*, FLORIDA INSURANCE COUNCIL, <http://flains.org/fact-book-othermenu-38/904-property-insurance-background/7104-reconstruction-costs-not-market-value-key-to-homeowners-insurance317.html> (last visited May 8, 2016) (discussing the difference between insurer-covered reconstruction costs, and market value).

<sup>101</sup> *See supra* note 100; STEMPEL & KNUTSEN, *supra* note 67, § 8.02 at 8-8 – 8-3 (identifying insurers' typical use of “actual cash value” as “the cost to rebuild the property less the reduction in the value of the property caused by depreciation” and “replacement cost” as “based on modern construction (or reconstruction) costs”); *see generally* Travelers Indem. Co. v. Armstrong, 442 N.E.2d 349, 352–53 (Ind. 1982) (discussing the different judicial techniques for measuring replacement cost and actual cash value).

<sup>102</sup> For example, analysis of construction cost data maintained by Engineering News-Record shows that only 3% of metropolitan area-month combinations had a 12-month change (positive or negative) of more than 10% from 2002 through 2011, and 0.2% had a change exceeding 15%. For additional discussion of this data source, see *infra* notes 104–105 and accompanying text.

<sup>103</sup> *See supra* note 100.

source to publish monthly construction cost estimates at a sub-national level.<sup>104</sup> The indices are published for twenty metropolitan areas around the country.<sup>105</sup> States with more than one indexed metropolitan area were assigned the average across areas; states with no indexed metropolitan area were assigned the index for the closest metropolitan area.

Finally, I included the growth rate in statewide income per capita<sup>106</sup> and the log of the statewide monthly unemployment rate.<sup>107</sup> These two indicators were included to track the general economic health of policyholders. Low incomes or high unemployment might drive policyholders to “cash out” potentially overinsured homes who would otherwise resist in times of a good economy, so each could be thought to affect claims behavior.<sup>108</sup>

### B. *Additional Non-Economic Indicators*

Non-economic indicators may also impact policyholder behavior. Lender foreclosure laws are thought to affect policyholders’ intentional loss decisions, because collecting from one’s insurance policy for a total loss can act as a substitute for the foreclosure process.<sup>109</sup> Therefore, if the foreclosure process becomes more onerous, fire claims can be expected to rise.<sup>110</sup> To capture characteristics of the mortgage foreclosure process, I apply indices typically used to study subprime lending and foreclosure laws.<sup>111</sup> The indices capture whether the state allows nonjudicial foreclosure; lenders’ right to pursue any deficiency remaining on the mortgage after selling the foreclosed property; and whether homeowners have a right of redemption allowing them to reclaim a pending foreclosure from the mortgage company.<sup>112</sup>

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<sup>104</sup> More information about the two indices can be found at *Construction Economics*, ENGINEERING NEWS-RECORD, <http://www.enr.com/economics> (last visited May 8, 2016). The principal difference between the two indices is the labor component, with one index incorporating specialized labor rates and the other index including only general labor rates. I averaged together the percentage change in each index to develop a composite construction cost index.

<sup>105</sup> *Id.*

<sup>106</sup> The U.S. Bureau of Economic Analysis quarterly per capita income data were converted to monthly figures assuming linear changes from one quarter to the next. Per capita income was not adjusted for seasonality. For information on the Bureau of Economic Analysis data, see <http://www.bea.gov/regional/> (last visited May 8, 2016).

<sup>107</sup> Monthly unemployment rates, not adjusted for seasonality, are available from the U.S. Bureau of Labor Statistics, <http://www.bls.gov/data/> (last visited May 8, 2016).

<sup>108</sup> See Goebel & Harrison, *supra* note 20, at 50–52 (collecting statements to this effect). For more on this “moral” aspect of moral hazard, see Baker, *supra* note 7, at 250–52; see also *supra* notes 30–31 and accompanying text (discussing this in the context of homeowners insurance).

<sup>109</sup> See, e.g., Goebel & Harrison, *supra* note 20, at 57.

<sup>110</sup> *Id.*

<sup>111</sup> Quinn D. Curtis, *State Foreclosure Laws and Mortgage Origination in the Subprime Market*, 49 J. REAL ESTATE FIN. & ECON. 303 (2014).

<sup>112</sup> *Id.*

I also include the statewide housing vacancy rate.<sup>113</sup> Higher vacancy rates might lead to more property destruction; with fewer nearby houses populated with watchful eyes, intentional property destruction becomes easier, and unintentional fires may develop into larger ones before they are noticed. Higher vacancy rates may also capture residual indications of a stagnant real estate market, such that “selling” one’s house to an insurance company through an insurance claim is more attractive than selling it on the open market.<sup>114</sup> On the other hand, high vacancy rates could also be associated with higher burglary, theft, property destruction, and vandalism rates, which would tend to reduce fire claim odds.

### C. *Additional Indicators*

In addition to the data explicitly included in the model, a variety of other factors could be expected to influence fire rates. For example, some areas of the country are more susceptible to wildfires than others; these areas might reasonably be assumed to have higher fire loss rates wholly independent of other factors. To capture residual factors, the models include a variety of state, region, and time-specific fixed effect variables depending on the particular model being tested. These variables capture factors that the model does not explicitly include, when those factors remain constant over a period of time.

Many intuitive factors that are not explicitly included will be captured in these fixed effect variables. For example, the impact of a state or region’s susceptibility to wildfires, its vigorousness of criminal prosecutions, its population’s penchant for crime, and cultural differences across states or regions all are incorporated into these fixed effects variables, as long as those impacts remain constant over the period of time captured by the fixed effect variable (yearly, or the entire sample period, depending on the model). Certain specifications of the models also account for state-calendar month or region-calendar month fixed effects and countrywide year-month fixed effects. These are designed to incorporate differences in state or regional fire rates that vary by season, and nationwide year-month factors such as extreme climate conditions or a national disruptive event. The fixed effects that are incorporated into any particular model are indicated for each model.

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<sup>113</sup> These data are available annually from the U.S. Census. <http://www.census.gov/housing/hvs/index.html> (last visited May 8, 2016). Annual numbers were converted into monthly figures assuming linear changes from one year to the next.

<sup>114</sup> See Goebel & Harrison, *supra* note 20. Although this explanation has been suggested, recall that insurers often condition total loss payments on using the money to rebuild one’s home, which eliminates homeowners’ ability to monetize an illiquid house asset through insurance. See *supra* note 58.

#### IV. EMPIRICAL TESTS FOR MORAL HAZARD

This Part conducts two tests for moral hazard in homeowners insurance, using as its primary data source the insurance industry claims database described previously. First, I test whether the odds of an insurance claim occurring because of fire – as opposed to other reasons, like burglary or vandalism – are higher in states with valued policy laws compared to states without these laws. The intuition driving this analysis is that because valued policies compensate policyholders at least as well as comparable non-valued policies, we should expect more insurance claims to be filed for fire losses – the source of loss to which valued policy laws apply – in valued policy law states.

Second, I also test the impact of valued policy laws by looking to a unique experience in Louisiana. Louisiana's Supreme Court unexpectedly rejected its valued policy law in 2008. This event allows us to isolate valued policy laws' effect on claims by determining whether insurance fire claim rates in Louisiana vary significantly before and after the change.

The following two Subparts describe the two tests and their results.

##### A. *Cross-Sectional Comparison*

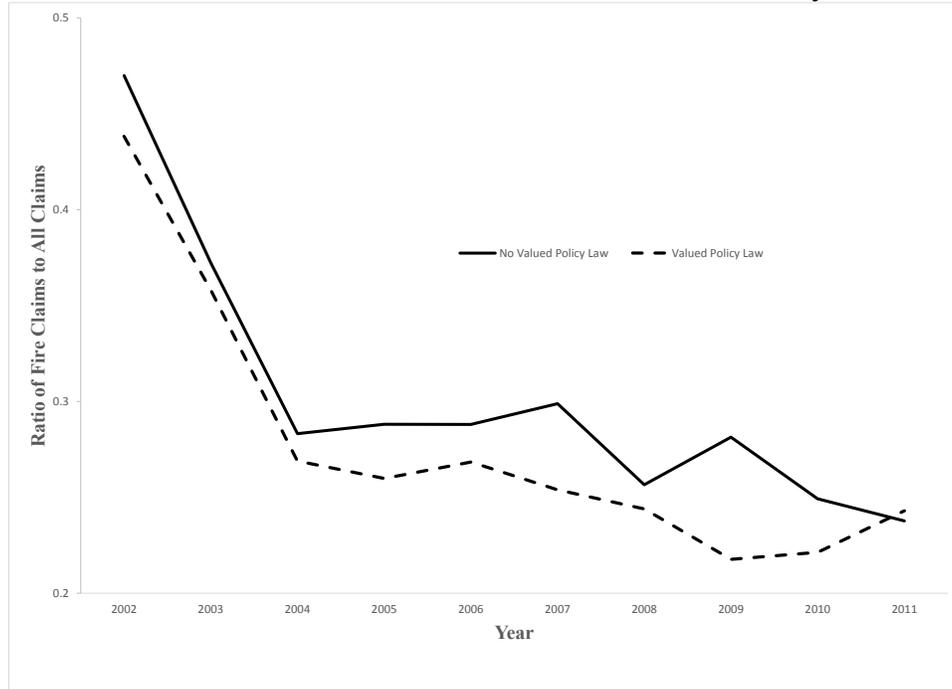
The first test for policyholder moral hazard compares fire loss rates in states with and without valued policy laws. If policyholders respond to rational economic incentives, then we would expect fire rates to be higher in states with valued policy laws than in states without, because of valued policies' higher payout rates.

As a preliminary inquiry into this issue, we can compare the proportion of the number of fire claims to total claims in states with and without valued policy laws.<sup>115</sup> Figure 2 does so. As the Figure reveals, the initial results are not promising for a policyholder moral hazard story. In all but the final year of the sample period, fire rates are *lower*, not higher, in states with valued policies than in states without.

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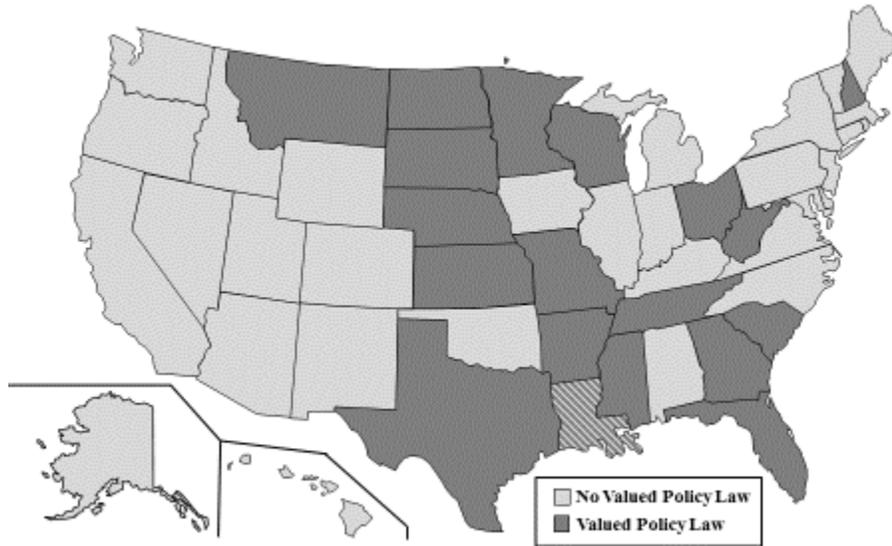
<sup>115</sup> I identified states with valued policy laws by individually examining the insurance statutes of all fifty states. My examination yielded the same collection of states identified by others as having valued policy laws. See STEMPER & KNUTSEN, *supra* note 67, § 15.04[B], at 15-73 – 15-74; see also *supra* note 67 (discussing comparison with others' identification).

Figure 2  
Fire Claims Rates: States With and Without Valued Policy Law



This initial analysis does not provide definitive results on its own, however, because there could be other differences correlated with the presence of valued policy laws that explain the difference in fire claim rates. Indeed, as Figure 3 shows, states with valued policy laws are relatively concentrated in the middle United States, which might naturally feature lower incidence of fires due to, perhaps, comparative immunity from forest fires, regional norms against intentional fire-setting, economic characteristics, or other reasons.

Figure 3  
Distribution of States with Valued Policy Law



As discussed more fully later in this Part, Louisiana had a valued policy law for part of the relevant time period.

Therefore, I conduct a systematic comparison of states with and without valued policy laws, controlling for various factors that might explain fire loss rates. This is done by performing a logistic regression. Logistic regressions are used to model binary dependent variables: in this case, whether an individual claim submitted to an insurer stems from a fire loss, or instead from a non-fire loss (burglary, personal property destruction, theft, or vandalism). The outcome of an individual insurance claim – a binary variable that takes the value of 1 if due to fire, and 0 if due to any other cause – is regressed against the explanatory variables identified in Part III. When the explanatory variable has a positive estimated coefficient, it means that an increase in the value of that explanatory variable is associated with increases in the odds that a filed claim will be due to fire damage; conversely, when the explanatory variable has a negative coefficient, increases in the value of that explanatory variable correlate with reduced odds of a claim resulting from fire damage.<sup>116</sup>

Table 1 contains the results of this analysis for the entire sample of claims. The negative estimate for the valued policy law variable signifies that the presence of a valued policy law is associated with *reduced* odds that a claim will be due to fire, relative to another cause. The estimate is significant in the statistical and popular sense – it implies that the odds of claims being due to fire in valued policy law states are only 83% to 84% of the odds in a comparable state without valued policy laws. Contrary to

<sup>116</sup> A one-unit increase in an explanatory variable's value will impact the probability of a claim's being due to fire by a factor of  $e$  raised to the power of the explanatory variable's coefficient estimate.

expectations, therefore, valued policies are correlated with *lower* rates of insured fire losses, rather than higher rates. In other words, the valued policy law results from Table 1 are not consistent with standard predictions.

Table 1 also shows that recent housing price declines – although not construction costs – are correlated with higher fire rates. We might cast this result as consistent with moral hazard. Even though construction costs, and not home prices, determine insurance payouts,<sup>117</sup> if policyholders *believe* that insurance payments are conditioned on house prices (as is popularly assumed),<sup>118</sup> then we might expect homeowners to encourage fire losses when recent housing price declines widen the gulf between real estate values and insurance amounts.

Table 1 is also notable for the absence of other significant relationships among variables and fire rates. In most models, most of the variables we might expect to be associated with homeowner moral hazard – construction costs, individual wealth, unemployment rates, and judicial characteristics of the foreclosure system – have no significant relationship with fire claim probabilities.

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<sup>117</sup> See *supra* notes 99–103 and accompanying text.

<sup>118</sup> See *supra* note 96.

Table 1  
Predictors of Claims Due to Fire

	(1)	(2)	(3)	(4)
-----Total Sample-----				
Valued Policy Law	-0.193** (0.080)	-0.175** (0.078)		
Construction Cost Change (12 month)	0.000 (0.012)	-0.006 (0.011)	0.004 (0.012)	0.003 (0.013)
Housing Price Change (12 month)	-0.014** (0.006)	-0.000 (0.006)	-0.011** (0.006)	0.012 (0.010)
Income per Capita Growth Rate (12 month)	0.010 (0.014)	-0.003 (0.012)	-0.000 (0.015)	-0.012 (0.014)
Unemployment Rate (Log)	-0.034 (0.151)	0.113 (0.182)	-0.216 (0.139)	0.647* (0.335)
Housing Vacancy Rate (Log)	-0.303*** (0.084)	-0.278*** (0.078)	-0.093 (0.087)	-0.126* (0.072)
Foreclosure Terms				
Deficiency: Most Borrower Friendly	0.187 (0.217)	0.165 (0.206)		
Deficiency: Med. Borrower Friendly	0.128 (0.152)	0.113 (0.151)		
Deficiency: Least Borrower Friendly	0.080 (0.155)	0.069 (0.149)		
Nonjudicial Foreclosure	-0.065 (0.082)	-0.068 (0.080)		
Redemption Right Allowed	-0.051 (0.083)	-0.050 (0.079)		
<i>N</i>	4,095,435	4,095,435	4,095,435	4,095,435
Region Fixed Effects	Y	Y	N	N
Region-Year Fixed Effects	N	Y	N	N
State Fixed Effects	N	N	Y	Y
State-Year Fixed Effects	N	N	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke versus other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

However, even though most traditional variables have little impact on fire claim propensity for the sample as a whole, perhaps the factors have selective impacts according to whether a state requires valued policies. For example, insurers may respond to valued policy laws by issuing fewer policies with face values that exceed the house's value, because insurers must pay the full face value in these states.<sup>119</sup> This response might mean housing price or replacement cost changes will have a larger impact in valued policy law states – where a slight price decrease might make the difference between overinsurance and underinsurance – than in other states, whose houses might more often have an overinsurance insurance “buffer” built in.

To explore this issue, I repeated the analysis on two subsamples: those states with valued policy laws, and those states without. Table 2 contains the results. As the Table shows, the results are not meaningfully different between subsamples. The implications from these results are explored fully in the next Part.

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<sup>119</sup> Indeed, this is one of the responses envisioned by valued policy law proponents. See *supra* note 80 and accompanying text; STEMPEL & KNUTSEN, *supra* note 67, § 15.04[B] p. 15-74.

Table 2  
Predictors of Claims Due to Fire: By State Type

	(1)	(2)	(3)	(4)
	No Valued Policy		Valued Policy	
	Law Only		Law Only	
Construction Cost Change (12 month)	0.002 (0.014)	0.000 (0.017)	-0.001 (0.005)	0.010** (0.004)
Housing Price Change (12 month)	-0.012* (0.006)	0.014 (0.013)	-0.002 (0.003)	-0.000 (0.005)
Income Per Capita Growth Rate (12 month)	-0.017 (0.026)	-0.018 (0.022)	0.012 (0.009)	-0.003 (0.012)
Unemployment Rate (Log)	0.020 (0.219)	1.015* (0.597)	-0.243** (0.100)	0.252 (0.217)
Housing Vacancy Rate (Log)	-0.052 (0.120)	-0.124 (0.093)	-0.127* (0.070)	-0.060 (0.048)
<i>N</i>	2,716,916	2,716,916	1,378,519	1,378,519
State Fixed Effects	Y	Y	Y	Y
State-Year Fixed Effects	N	Y	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke versus other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

#### B. *Difference-in-Differences Analysis*

The cross-sectional comparison of states with and without valued policy laws suggests that valued policy laws do not cause higher fire rates. This analysis can be bolstered by taking advantage of a unique judicial event that occurred in Louisiana in 2008 to conduct a second, independent test of valued policy laws' effects.

Until May 2008, Louisiana was a robust valued policy law state, requiring insurers to indemnify homeowners at full policy face value for total fire losses.<sup>120</sup> Unexpected change came courtesy of the state's Supreme Court in *Landry v. Louisiana Citizens Property Insurance*

<sup>120</sup> See, e.g., *Farmers-Merchants Bank & Trust Co. v. St. Katherine Ins. Co.*, 693 So. 2d 876 (La. Ct. App. 1997), *writ denied*, 703 So. 2d 25 (La. 1997).

*Company*, decided May 21, 2008, which effectively ended Louisiana’s valued policy law.<sup>121</sup> In finding valued policy laws did not apply to the plaintiff homeowner, the Court determined that Louisiana’s valued policy law applied only to “fire insurance,” as opposed to the more popular homeowners insurance that the policyholder had.<sup>122</sup> The determination was based on the valued policy law statute’s reference to “fire insurance” but not “homeowners insurance.” Formally, residential fire insurance and homeowners insurance are two different insurance policies.<sup>123</sup> As a practical matter, however, modern homeowners insurance policies have all but swallowed up narrower fire insurance policies, leaving residential fire insurance policies of little practical significance.<sup>124</sup> A determination<sup>125</sup> that Louisiana’s valued policy law applied strictly to fire insurance, rather than modern homeowners insurance policies that covered fire losses, therefore rendered the law inapplicable to most policyholders.

This judicial evisceration of Louisiana’s valued policy laws was quite a surprise. Insurers had not raised the distinction between fire insurance policies and homeowners policies in their litigation of the case, instead assuming that statutory references to fire insurance policies included by implication their modern homeowners insurance counterparts.<sup>126</sup> This

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<sup>121</sup> 983 So. 2d 66 (La. 2008).

<sup>122</sup> *Landry*, 983 So.2d at 74 n.10. The Court also based its finding on the fact that Louisiana’s valued policy law allowed insurers to opt out of its provisions as long as policyholders were supplied written notice during the policy application process. *Id.* at 80 – 81; LA. REV. STAT. ANN. § 22:1318(A) (2009). This latter finding appears to be of diminished importance. It is rather unusual for policyholders to receive such notice – the typical homeowners insurance application instead involves policyholders supplying basic information in exchange for a premium estimate, followed later by a policy, without intervening information about policy terms or property valuation methods. *See, e.g.*, Schwarcz, *supra* note 51, at 1320–22 (discussing the homeowners insurance application process); *Barham v. USAA Cas. Ins. Co.*, 14 So.3d 1166, 1173 (La. Ct. App. 2014) (describing homeowners insurance application via phone); *Frught v. Lafayette Ins. Co.*, 27 So. 3d 270 (La. 2010) (reversing a grant of summary judgment to an insurer because of factual dispute over whether policy application set forth alternative to valued policy law).

<sup>123</sup> *See, e.g.*, LA. REV. STAT. ANN. § 22:6 (2009); COUCH ON INS. § 148:4 (3d ed. 2015).

<sup>124</sup> Fire insurance policies originated at a time when insurers were more reluctant to cover non-fire risks, but have since been effectively replaced by more comprehensive homeowners insurance. For discussion of the progression from fire insurance to more general homeowners insurance, *see* COUCH ON INS., *supra* note 123, § 149:2.

<sup>125</sup> Although initially framed as dicta, this determination by the Louisiana Supreme Court has been widely followed in its jurisdiction. Indeed, the Supreme Court soon characterized this dicta as a holding, reflecting the perception shared by other courts. *Taranto v. Louisiana Citizens Prop. Ins. Co.*, 62 So.3d 721 (La. 2011); *see also* *Hibbets v. Lexington Ins. Co.*, No. 07-5169, 2009 WL 1668505 (E.D. La. June 12, 2009) (following the *Landry* holding); *In re Katrina Canal Breaches Consol. Litig.*, 601 F.Supp.2d 809 (E.D. La. 2009) (same); *Watson v. Allstate Ins. Co.*, No. 07-3462, 2009 WL 1704730 (E.D. La. June 17, 2009) (same); *Crescent City Prop. Redevelopment Assoc., LLC v. USAA Cas. Ins. Co.*, No. 2:06-11420, 2009 WL 982002 (E.D. La. Apr. 9, 2009) (same).

<sup>126</sup> *Landry*, 983 So.2d at 73–74; *see also* Order Granting Mot. Summ. J., *Frught v. Lafayette Ins. Co.*, No. 107-245, 2009 WL 7205339 (La. Dist. Ct. Mar. 20, 2009)

assumption was part of a wider judicial history, reinforced by court decisions in Louisiana and elsewhere, that extended statutory references of “fire policies” to fire losses covered by comprehensive homeowners policies.<sup>127</sup>

Louisiana’s rejection of this interpretation affords a unique opportunity to assess valued policy laws’ impact on fire claim rates. The prior analysis found, counterintuitively, that states with valued policy laws had lower rates of insurance claims from fires. This finding would therefore predict that when Louisiana courts effectively eliminated the state’s valued policy law, fire claim rates would rise. On the other hand, if policyholders respond as traditionally assumed by moral hazard theory, Louisiana should enjoy lower fire claim rates after eliminating its valued policy law.

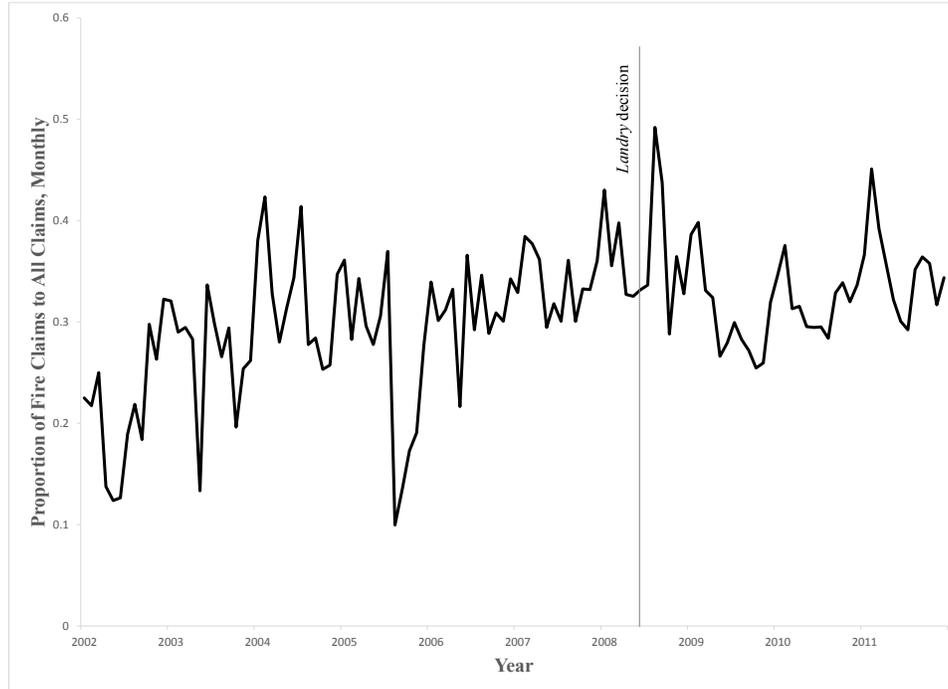
As an initial inquiry into this question, we can look at Louisiana’s fire claim rate over time. Figure 4 does so, charting Louisiana’s relative fire rate with the date of the *Landry* decision marked. A rough inspection of the Figure suggests that fire claim rates may have generally increased after the valued policy law effectively ended, which would be consistent with the results found in the earlier analysis, but which again runs contrary to moral hazard intuition.

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(reproducing State Farm and Allstate testimony that equated fire policies with homeowners policies).

<sup>127</sup> Caruso v. Allstate, No. 06-2613, 2007 WL 625830 \*10 (E.D. La. Feb. 26, 2006); Landry v. Louisiana Citizens Prop. Ins. Co., 964 So.2d 463 (La. Ct. App. 2007); Marchman v. Grange Mut. Ins. Co., 500 S.E.2d 659 (Ga. Ct. App. 1998), *cert. denied*, No. S98C1410, 1998 Ga. LEXIS 980 (Ga. Oct. 2, 1998); Johnson v. Madelia Lake Crystal Mut. Ins. Co., No. A03-820, 2004 WL 61057 (Minn. App. Jan. 13, 2004); Necaise v. U.S.A.A. Cas. Co., 644 So.2d 253 (Miss. 1992); Nat’l Grange Mut. Ins. Co. v. Firemen’s Ins. Co. of Newark, New Jersey, 425 S.E.2d 754 (S.C. Ct. App. 1992); Adams v. Tennessee Farmers Mut. Ins. Co., No. W2009-00931-COA-R3-CV, 2010 WL 1444477 (Tenn. Ct. App. Ap. 13, 2010); Vail v. Texas Farm Bureau Mut. Ins. Co., 754 S.W.2d 129 (Tex. 1988); *see generally* Mitchell F. Crusto, *Louisiana Valued Policy Law: When Total Loss Equals Total Payment?*, 55 LA. BAR J. 87, 88 (2007) (analyzing Louisiana’s valued policy law shortly before the *Landry* decision, concluding that Louisiana’s valued policy law “applies to homeowners’ policies unless it is a specific policy type expressly excluded by the Legislature.”)

Figure 4  
Louisiana Fire Claim Rate



Such a casual analysis is of only limited usefulness, however. What if, for example, Louisiana unluckily experienced a sustained bout of wildfires following spring 2008? Or what if Louisiana suffered significant unemployment after the *Landry* decision? If policyholders respond to difficult economic times by increasing their fire loss propensity, then a simple before and after comparison confined to Louisiana could overstate the real effect of legal change.<sup>128</sup> On the other hand, if Louisiana's economy by coincidence improved following the *Landry* decision, then Figure 4 could *understate* the impact of the valued policy law change.

Fortunately, a systematic analysis can be conducted by comparing Louisiana's fire claim odds to that of comparable states, controlling for various other factors that might differ among them. This analysis involves calculating the difference in Louisiana fire claim odds before and after the *Landry* decision, and comparing that difference to any difference in other states' fire claim odds, before and after the date of the *Landry* decision. This "difference in differences" analysis allows us to use other states as a control group, so that any relative difference in Louisiana's experience compared to the control group's can be attributed to Louisiana's valued policy law change.<sup>129</sup> This general approach is regularly used in empirical

<sup>128</sup> For reasoning along these lines, see *supra* note 108 and accompanying text.

<sup>129</sup> For more on the difference-in-differences approach, see JOSHUA D. ANGRIST & JORN-STEFFEN PISCHKE, *MOSTLY HARMLESS ECONOMETRICS* 227–42 (2009).

law and economics studies because of its ability to isolate the effects of legal change in a broader system.<sup>130</sup>

We can envision three different collections of states serving as a control group for Louisiana. The smallest control group that may most closely replicate non-observable characteristics of Louisiana consists of Mississippi and Texas – valued policy law states that border Louisiana and that also share its exposure to Gulf Coast weather events and other regional trends. The downsides of a small control group are its potential to be dominated by idiosyncratic peculiarities of one state, as well as its lack of statistical power. Therefore, a somewhat larger control group adds in Arkansas, the third valued policy law state bordering Louisiana. Arkansas, however, does not have Gulf exposure. Finally, the largest group consists of all states having valued policy laws, yielding a group of the 18 states shaded in Figure 3 and providing the greatest statistical power, although drawing from areas of the country that may differ in meaningful ways from Louisiana’s regional experience.

Table 3 collects the results of the difference-in-differences analysis using these three different comparison groups. To control for factors that may influence fire claim rates but that vary by state and time, the analysis includes the factors included in the cross-sectional regressions presented in Tables 1 and 2, such as housing prices. The analysis also includes year-month fixed effect variables, to capture the influence of seasonality on fire rates, and state fixed effect variables, which account for stable state-specific factors that have a constant influence on fire claim rates over the sample period, such as cultural differences, characteristics of the state’s housing stock, and relative concentration of urban versus rural real estate development.

Table 3 reveals a story strikingly similar to that of the cross-section analysis. That is, after Louisiana ended its valued policy law by judicial decree, the state had significantly higher odds of any particular insurance claim being due to fire, after controlling for the potentially-relevant factors discussed in the context of Tables 1 and 2.

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<sup>130</sup> *Id.* For a recent adaptation of this approach, see Michael D. Frakes & Melissa F. Wasserman, *Does the U.S. Patent and Trademark Office Grant Too Many Bad Patents?: Evidence from a Quasi-Experiment*, 67 STAN. L. REV. 613, 644–63 (2015).

Table 3  
Results of Difference-in-Differences Analysis, Pre- and Post-*Landry*

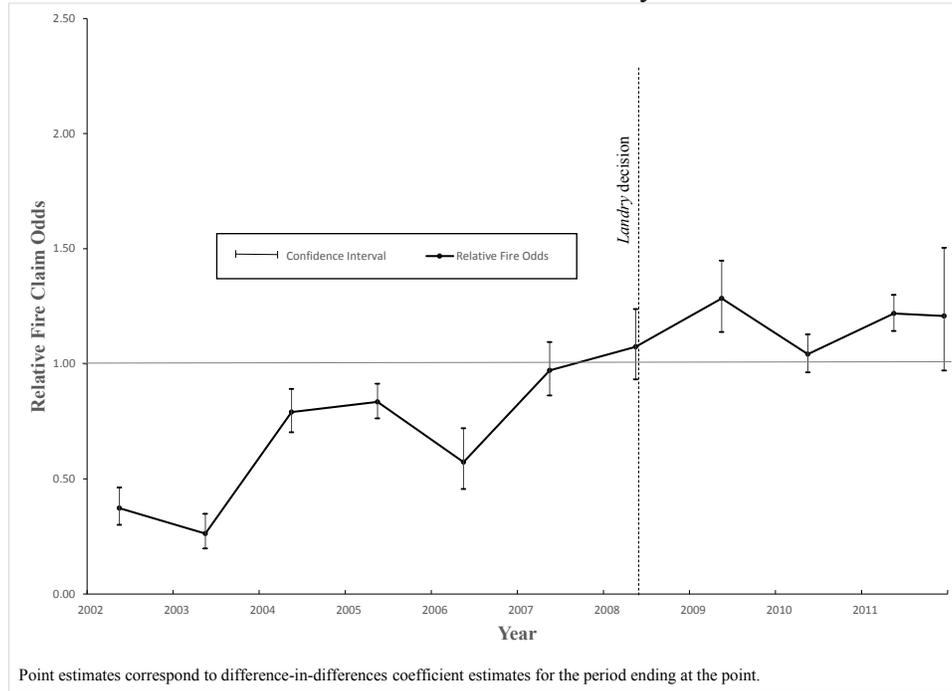
	(1)	(2)	(3)
Difference-in-Differences Coefficient Estimate	0.209*** (0.028)	0.224*** (0.031)	0.437*** (0.051)
<i>N</i>	436,354	467,932	1,398,757
Comparison States	Mississippi Texas	Arkansas Mississippi Texas	All Valued Policy Law States

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke relative to other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time. All regressions include state and year-month fixed effects and control for the non-judicial foreclosure explanatory variables of Tables 1 and 2.

We can also examine whether this difference emerged soon after the *Landry* decision or instead at some delayed point following the ruling. This can be done by repeating the difference-in-differences analysis in a dynamic fashion, calculating relative fire claim odds for successive discrete periods leading up to and following the *Landry* decision. Figure 5 shows the results of this dynamic process, using all valued policy law states as a control group and calculating relative fire odds for consecutive twelve-month periods. A pure cause-and-effect relationship between Louisiana's change to valued policy laws and policyholder behavior should manifest as a near-immediate and sustained increase in fire probabilities post-*Landry* relative to periods before the decision. An inspection of Figure 5 reveals that apparent relationship.

Figure 5  
Dynamic Difference-in-Differences Estimates  
Louisiana vs. All Other Valued Policy Law States



### C. Estimating Impact on Property Damage

Both the cross-sectional and difference-in-differences analysis suggest lower fire claim odds from valued policy laws. With certain assumptions, the estimates from these analyses can be used to derive approximate estimates for the savings in residential property damage associated with valued policy laws.

To do so, I begin by estimating the decrease in fire claim probabilities from valued policy laws. The analyses earlier in this Part derived fire claim *odds*, rather than *probabilities*; fire claim *probabilities* vary depending on the values of the other variables. Nevertheless, an approximation of the overall impact on fire claim probabilities can be derived from odds; Appendix B has additional information on this process. Doing so, the cross-sectional analysis suggests a 3.4 to 3.7 percentage point (or 12.2 to 13.2 percent) reduction in fire claim probabilities from valued policy laws. The difference-in-differences analysis suggests a 16 percentage point increase in Louisiana fire probabilities following its elimination of valued policies when compared to all valued policy law states.

With some additional estimates and additional assumptions, it is then possible to derive the economic impact of valued policy laws. The National Fire Protection Association, using data provided from fire departments around the nation, estimates annual direct residential property

damage to be \$7.6 billion nationally.<sup>131</sup> If we assume that valued policy laws' decrease in fire claim probabilities is due to an equivalent decrease in fire claim rates – that, for instance, the cross-sectional analysis's reduction in fire claim probabilities is not due to an uncontrolled increase in burglary, theft, vandalism, or personal property destruction – and that the decrease is distributed uniformly across fire severities, we can then derive property damage estimates.

By summing the product of each state's housing units<sup>132</sup> and average home price<sup>133</sup> for 2010, the latest year of available data, we can derive the value of residential housing in the country. Dividing the direct residential property damage estimate by this number shows that approximately 0.03% of residential property is damaged by fire each year. Multiplying this resulting number by the value of residential property in valued policy law states, and taking 12.2% or 13.2% of the resulting number to reflect the average decrease in fire rates from valued policy laws, yields an estimate range of \$252 million to \$272 million in annual residential property damage savings in states that have valued policy laws. Performing the equivalent exercise for Louisiana's elimination of valued policy laws suggests an increase of \$32 million to \$79 million in annual residential property damage in Louisiana after eliminating its law.

Again, it should be stressed that these estimates are subject to a number of strong assumptions. But given these figures, it is natural to consider whether enacting valued policy laws would promote significant annual savings. Although the decrease in direct economic damage to residential property would be appealing, valued policy laws may bring their own countervailing costs, which I consider briefly in Part V. Moreover, it must be the case that valued policy laws *cause* changes in fire loss claim odds, which I consider next.

#### D. Causation?

Both the cross-sectional and difference-in-differences analysis suggest a surprising association between nominally moral hazard-enhancing valued policy laws, and a decrease in fire loss claims. Is it possible to draw a causative link between this association?

Outside the controlled experiment environment, it is notoriously difficult to do so.<sup>134</sup> Effects that appear causative may instead be due to

<sup>131</sup> NATIONAL FIRE PROTECTION ASSOCIATION, STRUCTURE FIRES BY OCCUPANCY, 1 (2013).

<sup>132</sup> *Housing Units Intercensal Estimates (2000-2010)*, CENSUS, <https://www.census.gov/popest/data/intercensal/housing/tables/HU-EST00INT-01.xls> and *Annual Estimates of Housing Units for the United States and States: April 1, 2010 to July 1, 2014*, CENSUS, <http://factfinder2.census.gov/bkmk/table/1.0/en/PEP/2014/PEPANNHU>.

<sup>133</sup> *House Price Index Datasets*, FEDERAL HOUSING FINANCE AGENCY, <http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx> (last visited Jan. 13, 2017).

<sup>134</sup> ANGRIST & PISCHKE, *supra* note 129, at 11.

unobserved characteristics that can eliminate the proposed causation chain or even reverse it entirely.<sup>135</sup> Applied to our particular case, perhaps states that adopt valued policy laws do so because, for unobservable reasons, their citizens are relatively resistant to moral hazard, which would maximize the benefits of these laws while minimizing the downsides. This situation would result in finding lower fire rates in states with valued policy laws, as I do, without these laws *causing* lower fire rates.

For two reasons, we might dismiss this concern. First, and most strongly, as the difference-in-differences analysis reveals, an *unexpected change* in the law is associated with a change in behavior. Because the change was unexpected and apparently unprovoked, Louisiana's experience closely mimics the virtues of the controlled experiment environment – with the added benefit of observing behavior in the real world. Nevertheless, if we think the unexpected judicial change happened to coincide with an unobserved change in Louisiana at approximately the same time, the causative conclusion could still be undermined.

Second, the cross-section analysis, while not necessarily analyzing a random assignment of laws, also benefits from many of the virtues of a controlled experiment. Most states' positions on valued policy laws were determined decades ago;<sup>136</sup> for many, the laws were originally passed in the 1800s.<sup>137</sup> It seems unlikely that any meaningful unobservable differences that existed a century ago and led to the adoption of these laws would persist to the present day. Moreover, any factors that *do* stand this test of time might be expected to continue, in which case they would be captured by the fixed effects variables included in the cross-section analysis of Tables 1 and 2. The cross-section comparison would suffer only from some unobservable element that changed during the sample period proportionately more for states with (or without) valued policy laws. This is not to say that such an event could not happen, but the probability of its doing so seems rather small.

None of this is to say that causation can be definitively established when relying on natural world events and actual individual behavior, as this study does. Nevertheless, the consistent results between the two independent tests should assuage most causative concerns that commonly afflict studies outside the controlled laboratory environment. And the advantage of relying on real world events is that the study rests on the

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<sup>135</sup> See, e.g., Melissa F. Wasserman, *Deference Asymmetries: Distortions in the Evolution of Regulatory Law*, 93 TEX. L. REV. 625, 643 (2015) (describing the problems associated with the particular case of biased sample selection).

<sup>136</sup> See, e.g., STEMPEL & KNUTSEN, *supra* note 67, § 15.04[B] at 15-74 (“most states with valued policy laws enacted them during the late nineteenth and early twentieth centuries”); HAYDEN’S ANNUAL CYCLOPEDIA OF INSURANCE IN THE UNITED STATES, *supra* note 73, at 619 – 24 (identifying 19 states with valued policy laws in 1900).

<sup>137</sup> HAYDEN’S ANNUAL CYCLOPEDIA OF INSURANCE IN THE UNITED STATES, *supra* note 73, at 619 – 24 (identifying 19 states with valued policy laws in 1900); see generally MISS. CODE ANN. § 83-13-5 (valued policy enacted in 1936 and unchanged since then).

actual behavior of real individuals making meaningful life decisions, rather than the results reported from a more sterile laboratory environment.

## V. IMPLICATIONS

The empirical findings described in the preceding Part have several useful implications. The following Subparts explore implications for states' valued policy laws, and for modeling how individuals and other players respond to financial incentives.

### A. *Implications for Valued Policy Laws*

Although valued policy laws were first passed over 100 years ago, the debate on their relative costs and benefits still remains unsettled today. Even now states continue to abandon and readopt valued policy laws with surprising frequency, while others consider their adoption for the first time.<sup>138</sup>

A significant reason for this regulatory oscillation no doubt stems from the lack of consensus over valued policy laws' benefits and their costs. While there may be reason independent of this Article's analysis to doubt valued policy laws' benefits,<sup>139</sup> this analysis shows that any costs from an increase in moral hazard and fire rates may be insignificant. To be sure, moral hazard is not the sole downside of valued policy laws,<sup>140</sup> but it is the concern most commonly identified by these laws' critics.<sup>141</sup> And if the costs of these laws are less than traditionally assumed while everything

<sup>138</sup> See, e.g., *Landry*, 983 So.2d at 77 (describing Louisiana's 1988 repeal and subsequent 1991 reenactment of valued policy law); *Seider*, 612 N.W.2d at 221 (describing Wisconsin's 1975 repeal and subsequent 1979 reenactment of valued policy law); Aldo Svaldi, *Fires Reignite Debate over Valued Policies in Colorado*, DENVER POST, Nov. 11, 2012, [http://www.denverpost.com/ci\\_21968732/fires-reignite-debate-over-valued-policies-colorado](http://www.denverpost.com/ci_21968732/fires-reignite-debate-over-valued-policies-colorado) (describing legislative attempts in Colorado to pass valued policy law).

<sup>139</sup> In particular, competitive property insurance markets seemingly solve many of the problems valued policy laws are designed to fix. See Daniel Schwarcz, *A Products Liability Theory for the Judicial Regulation of Insurance Policies*, 48 WM. & MARY L. REV. 1389, 1463 (2006) 1403 (collecting evidence on price competitiveness). For example, in states without valued policy laws, market forces would push insurers' pricing models so that any "overinsurance" from a policy's face value exceeding property value does not increase insurance premiums.

<sup>140</sup> For example, valued policy laws make it more expensive – and perhaps more difficult – for policyholders to obtain a policy whose face value exceeds replacement costs or actual cash value. Rational policyholders may want such a policy to insure against unexpectedly high replacement costs or property value, which may occur not only because these costs cannot be estimated with exact precision, but also because market forces may render labor or materials unexpectedly expensive at the time of loss, which increases both replacement costs and actual cash value. See, e.g., Elliot Spagat, *Insurance Calculator Questioned*, WASH. POST, July 24, 2004, <http://www.washingtonpost.com/wp-dyn/articles/A9509-2004Jul23.html> (interviewing insurance representatives who note that estimating housing values is "not an exact science" and that "replacement costs tend to skyrocket after major disasters.")

<sup>141</sup> See *supra* notes 75–79 and accompanying text.

else remains equal, the overall desirability of valued policy laws increases. In that case, a better case for valued policy laws could be made.

However, it seems unlikely that everything else is remaining equal. Explaining how valued policy laws apparently *reduce* fire rates without something else also changing is exceptionally difficult. After all, it is undisputed that, everything else equal, valued policy laws provide *greater* economic incentives for both intentional and nonintentional residential fires than their non-valued counterparts. To explain the contradictory finding seemingly requires something else to be changing coincident with the presence of valued policy laws.

Two likely candidates readily emerge. First, it could be that policyholders do not respond to economic incentives in traditional ways, such that the appearance of valued policy laws causes them to reduce their fire proclivities. Or second, it could be that insurers react to valued policy laws by changing their behavior in a way that ultimately reduces fire rates. I consider each in turn.

### 1. Do Policyholders Act Differently?

The first path to a full understanding of the connection between valued policy laws and fire rates involves examining the link between economic incentives and policyholder behavior. A policyholder is always compensated at least as generously in a valued policy law state as she is with a comparable insurance policy in a non-valued policy law state;<sup>142</sup> a policyholder who reacts rationally to these financial incentives will therefore have higher fire rates. But nothing requires policyholders actually to respond to these financial incentives in accordance with economic theory. So, perhaps the presence of a valued policy law somehow leads policyholders to lash out against financial incentives, thereby lowering fire rates.

Such a conclusion is difficult to draw, but perhaps not impossible. If, for instance, policyholders viewed valued policy laws as also imposing a non-economic obligation to resist moral hazard, this non-economic obligation could outweigh any economic incentives for fire that valued policy laws provide.<sup>143</sup> There is little evidence to support this view, however – in fact, many policyholders seem disturbingly pleased by imposing questionable losses on insurance companies.<sup>144</sup> Moreover, there is little evidence that policyholders are even *aware* of whether their

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<sup>142</sup> See *supra* notes 66–68 and accompanying text.

<sup>143</sup> See generally Uri Gneezy & Aldo Rustichini, *A Fine Is a Price*, 29 J. LEG. STUD. 1 (2000) (finding monetary penalties more than outweighed by prior non-monetary disincentives). Or, perhaps states with especially moral citizens are more likely to adopt valued policy laws, because their populations render these laws' downsides relatively unimportant, although the age of these laws and Louisiana's unexpected change make this explanation unlikely. See *supra* notes 134 – 137 and accompanying text for additional discussion.

<sup>144</sup> See TOBIAS, *supra* note 31 (discussing several instances of this behavior).

policies are governed by valued policy laws,<sup>145</sup> in which case we cannot tie a legal rule to a behavior change by policyholders. Explaining the empirical findings via a direct policyholder response to valued policy laws is therefore not promising.

However, policyholder behavior may still be indirectly tied to valued policy laws if some intervening entity reacts to the laws by sending a signal to which policyholders *are* responsive. Insurance companies are one likely candidate.

## 2. Do Insurers Act Differently?

The second path assumes that insurers change their behavior in response to valued policy laws in a way that ultimately reduces policyholder loss rates. Since claims for total losses are at least as costly to insurers in valued policy law states as comparable claims in other states, insurers in valued policy law states should take greater steps to mitigate these losses, thereby reducing the amount they need to pay out.

Insurers might do so through reducing the probability that a fire occurs, such as by providing more loss-prevention education to policyholders. Yet these efforts are an inefficient way for insurers to achieve their desired goal. Valued policy laws require insurers to pay more only if the property is overinsured; insurers pay the same when homes are insured for amounts less than or equal to their value. Insurers in valued policy law states therefore care most about deterring fires for overinsured homes. Since the percentage of homes that are overinsured is low,<sup>146</sup> most of an insurer's extra fire prevention measures would therefore be wasted.<sup>147</sup>

Insurers could also respond by reducing their cost once a fire happens, such as by issuing insurance policies with lower limits.<sup>148</sup> This explanation is more promising. If insurers know they have to pay out full policy face value whenever a total loss occurs in a valued policy law state, they have the incentive to issue fewer "inflated" insurance policies and to reduce the amount by which those policies are inflated. This means that on average, insurers will issue policies with lower limits in valued policy

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<sup>145</sup> See *supra* note 96; NAT'L ASS'N OF INS. COMM'RS, HOMEOWNERS, INSURANCE SURVEY 1 (2007), [http://www.naic.org/documents/newsroom\\_homeowners\\_insurance\\_summary.pdf](http://www.naic.org/documents/newsroom_homeowners_insurance_summary.pdf) (finding low awareness among policyholders for several fundamental terms of standard homeowners insurance contract).

<sup>146</sup> See MARSHALL & SMITH, *supra* note 40 (finding a significant number of homes are underinsured).

<sup>147</sup> Or, more accurately, the benefits to an insurer from general fire prevention are largely the same regardless of whether the state has a valued policy law, so the insurer should not meaningfully alter its practices based on the law, which fails to explain the empirical findings.

<sup>148</sup> They might also prosecute fraud with greater intensity, since intentional losses are excluded from coverage. See *supra* note 52 and accompanying text. However, more intense fraud prosecution would not result in the observed lower fire rates in valued policy law states unless potential arsonists are deterred by the increased prosecution risk.

law states.<sup>149</sup> If we combine this fact with an assumption that policyholder behavior is responsive to the gap between insurance values and home prices, then we can explain the empirical finding that valued policy law states have lower fire claim probabilities. Insurance policies in valued policy law states have lower limits than policies for comparable homes in non-valued policy states, leading to lower policyholder moral hazard and therefore lower fire rates in valued policy law states.

This explanation is intuitively attractive, and the earlier empirical tests provide some evidence to support it. As Tables 1 and 2 show, to the extent policyholders are responsive to overinsurance, it is generally in the direction that the prior paragraph predicted. That is, a decrease in home prices, and an increase in what is popularly believed to be overinsurance, generally *increases* the probability of fire loss claims. While the relationship is not as systematically statistically significant as we might hope, it is robust to a variety of alternative home price specifications, as shown in the Appendix.

If there were evidence that insurers actually issued lower policy amounts in valued policy law states, then this argument would be even better. Unfortunately, data on private insurers' operations are notoriously difficult to assemble.<sup>150</sup> Although valued policy law proponents *assume* insurers may act this way,<sup>151</sup> this Article has already shown the problems that can result from conventional assumptions in insurance markets. More evidence is needed before drawing a firm conclusion on the causal mechanism.

A disparate response by insurers in valued policy states is not the only assumption required by this explanation. It must also be the case that policyholders do not fully understand their policies, so that "overinsurance"<sup>152</sup> – where the policy face value exceeds the house value or replacement cost – exacerbates moral hazard in both valued and non-valued policy states. As was discussed in Part I, outside of valued policy law states, insurers pay the lesser of the value of destroyed property or the policy face value.<sup>153</sup> Therefore, in non-valued policy law states, overinsurance should have minimal effect on rational moral hazard, because the policyholder is not paid the excess policy value in the event of overinsurance. Only if policyholders do not understand this contractual term will a change in insurer pricing practices produce a change in

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<sup>149</sup> Valued policy law advocates have hoped that these lower limits will also more accurately reflect home prices. See *supra* notes 80–81 and accompanying text.

<sup>150</sup> Daniel Schwarcz, *Transparently Opaque: Understanding the Lack of Transparency in Insurance Consumer Protection*, 61 UCLA L. REV. 394, 413–35 (2014) (identifying the lack of transparency in property/casualty insurance).

<sup>151</sup> See *supra* notes 80–81 and accompanying text.

<sup>152</sup> The focus here is on *overinsurance*; if insurers did not overinsure homes, then there would be no financial reason for them to reduce policy amounts in valued policy law states, because insurer payouts are the same regardless of state when policy amounts do not exceed dwelling values.

<sup>153</sup> See *supra* notes 57–58 and accompanying text.

policyholder behavior. While such an assumption may not be unwarranted – even experts sometimes assume overinsured policyholders are always paid the policy face value<sup>154</sup> – it should be more rigorously tested before being accepted.

Notably, an explanation that focuses on *insurer* behavior, rather than policyholder behavior, as the direct response to the presence or absence of a valued policy law does not require that homeowners have knowledge of their state’s laws, nor does it require that Louisiana policyholders know when their laws change. This is helpful, as it is unlikely that most policyholders understand the finer minutiae of insurance law, let alone have knowledge of when these minutiae change. Indeed, the public’s comprehension of legal rules is already low in a variety of contexts outside of technical-heavy insurance law.<sup>155</sup> What this explanation *does* require is that *insurers* understand the legal playing field and price their policies accordingly, with these price signals transmitted to policyholders who then act accordingly. An assumption that insurers, instead of policyholders, are aware of the legal system and that policyholders are responsive to highly salient premiums is far more palatable.<sup>156</sup>

Note also that if insurers respond to valued policy laws by reducing insurance policy face values, then new, substantial, and unexpected costs may be introduced as a consequence of valued policy laws, offsetting some or all of the fire loss savings. If insurers respond to valued policy laws by reducing policy limits below levels needed to replace destroyed homes, then policyholders in these states suffer by being underinsured in the event of a loss.<sup>157</sup> Although typical insurer practices are usually assumed to incentivize writing policies with higher face values and therefore higher premiums and profits,<sup>158</sup> in valued policy law states it may be worth trading off some premium income for the lower loss rates, and lower payouts in the event of a loss, that can be achieved by reducing policy limits. The reduction in moral hazard in valued policy law states,

<sup>154</sup> See, e.g., TOBIAS, *supra* note 31, at 107 (suggesting a money-making opportunity by burning down overinsured homes).

<sup>155</sup> See, e.g., Paul H. Robinson & John M. Darley, *Does Criminal Law Deter? A Behavioural Science Investigation*, 24 OXFORD J. LEG. STUD. 173 (2004) (arguing that criminal law has little deterrence effect because of low awareness, among other reasons).

<sup>156</sup> For example, insurers are quick to respond when states consider adopting valued policy laws. See, e.g., PROP. CAS. INS. ASS’N OF AM., *supra* note 21 (arguing that adopting valued policy laws in Colorado would increase insurance premiums). Policyholders are also routinely assumed to respond to premium prices, which arguably is the most salient term of an insurance contract. Schwarcz, *supra* note 51, at 1266 (asserting that policyholders’ purchase decision is “based almost exclusively on price, service, and general reputation.”) See generally Russell Korobkin, *Bounded Rationality, Standard Form Contracts, and Unconscionability*, 70 U. CHI. L. REV. 1203 (2003) (arguing that with standard form contracts like insurance policies, consumers care about only a limited number of highly salient terms, such as price.)

<sup>157</sup> MARSHALL & SMITH, *supra* note 40 (finding a significant number of homes to be underinsured).

<sup>158</sup> E.g., KEETON, *supra* note 79, at 142 (noting that one potential benefit of valued policy laws is their deterrent against writing excessive insurance policies).

then, can come at the expense of new and unanticipated costs, which may be more severe than the moral hazard costs initially contemplated.

### 3. Does Some Other Entity Act Differently?

The prior Subparts have analyzed how to explain the empirical results by changes in either policyholder or insurer behavior in response to valued policy laws. What about someone else beyond these two sets of players?

Although there is no evidence that other entities are acting differently because of valued policy laws, it is useful to consider the complete range of actors when attempting to explain the empirical results. Perhaps insurance regulators in valued policy law states are particularly likely to implement measures to combat moral-hazard of their own, for example. Analyzing a full set of actors not only can provide useful insight into how the link between valued policy laws and loss rates might emerge, but also should open up future avenues of research. It may be worth separately analyzing how other actors like insurance fraud bureaus, regulators, courts, or others could contribute to the observed findings if their behavior were systematically different when confronted with valued policy laws.

## B. *Implications for Modeling Behavior*

The prior sections illuminated implications for valued policy laws by considering how these laws might change the behavior not only of policyholders (in surprising ways), but also of insurers and others. These findings have more generalized useful implications for modeling behavior, which should produce more accurate assessments of insurance regulation's costs and benefits.

Insurance regulation has long relied on an assumption that individuals respond predictably to financial incentives.<sup>159</sup> If a behavior is made more expensive, then policyholders should be less likely to engage in it. This assumption fuels regulatory efforts in a variety of insurance markets, including specifically homeowners insurance, the domain of this study.<sup>160</sup>

This Article joins the increasing body of work that questions such a simple application of rational economic models to actual policyholder behavior.<sup>161</sup> Policyholders seemingly violate classical economic predictions by *decreasing* fire loss rates when financial incentives for them *increase* via valued policy laws; by showing responsiveness to housing price changes when those changes, contrary to popular conceptions, have no economic role in determining insurance payouts; and by *not* showing sensitivity to changes in replacement costs, the mortgage

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<sup>159</sup> See, e.g., Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 198, 213–228 (2012); ABRAHAM, *supra* note 63.

<sup>160</sup> E.g., Ben-Shahar & Logue, *supra* note 159, at 223–25.

<sup>161</sup> See, e.g., *supra* note 24 (citing work by Tom Baker); see generally HOWARD C. KUNREUTHER ET AL., *INSURANCE & BEHAVIORAL ECONOMICS* (2013) (reviewing selected insurance market phenomena from a behavioral perspective).

foreclosure process, or other economic indicators, all of which *do* impact the costs and benefits of rational economic decisionmaking. While these findings need not imply that policyholders are irrational, they *do* show that other, unconsidered players like insurance companies may also alter their practices in response to regulation, producing surprising behavior by policyholders at the end of the causal chain.

One of the challenges when studying a specific behavior is to produce conclusions that can be generalized to broader circumstances. This study is no different. Although understanding policyholder behavior in the context of fire losses and homeowners insurance has considerable importance of its own, deriving broader conclusions could extend this importance still further.

We can draw some tentative broader lessons apart from the obvious admonition of being careful to consider how theoretical incentives might play out in practice. I have already shown that a full appreciation of policyholder response to regulation depends not only on understanding of policyholder costs and benefits, but also on the ways that other actors like insurers may alter their practices, in turn shaping the incentives policyholders see. For example, insurance companies may change their underwriting practices in response to valued policy laws in a way that entirely eliminates any increase in policyholder-level moral hazard that the laws would otherwise add. Understanding this interaction will increase the chance that future predictions from theoretical models will align with reality, improving the effectiveness of insurance regulatory design.

In addition to that lesson, this study highlights how moral hazard in particular, and individual behavior in general, depends not so much on the actual economic incentives that exist, but more importantly on what individuals *perceive* those economic incentives to be. Other than the presence of valued policy laws, the next most significant driver of policyholder behavior appears to be recent changes in housing prices. Although housing price changes do not, as an economic matter, affect homeowners' insurance payment, the factor is commonly *believed* to do so. And at the end of the day, only those factors that individuals believe matter, and which they by extension incorporate into their decisionmaking, will affect behavior.

This implies that insurance law and policy can be important regulators of behavior, but only to the extent that they carry over into individual beliefs and decisionmaking. Sometimes that carryover can be indirect: for example, practices that affect insurers' premium prices, such as premium discounts for safe behavior, can end up impacting individual behavior even if individuals are not directly aware of those practices.<sup>162</sup> But in other instances, making individuals aware of already-existing systems might be a more effective means of regulating behavior than enacting new

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<sup>162</sup> *E.g.*, Ben-Shahar & Logue, *supra* note 159. Even these policies require at least some awareness by policyholders – while they need not know the nuances of the particular policy, they must know that a premium discount exists for safe behavior.

rules. Educating policyholders about fire prevention and the inability to profit from losses in non-valued policy law states, for example, might be more effective at deterring losses than enacting a valued policy law.

Grappling with individual beliefs adds a complicating layer on top of what is often already a difficult regulatory framework. To take the case of moral hazard, Part I showed that several factors will influence its prevalence. These factors need not all weigh in the same direction, making a theoretical assessment of moral hazard's severity a difficult and imprecise exercise. In homeowners insurance, some factors weigh strongly in favor of moral hazard, while others do not, leaving a muddled picture of the problem's severity.<sup>163</sup> Yet now an understanding of individual beliefs must be grafted onto this model, because without knowing how individuals interpret the relevant costs and benefits of a decision, it can become an exercise in futility to determine appropriate regulatory policy.<sup>164</sup> Although surveys and similar tools have eased the difficulty in determining these beliefs empirically, policymakers seem slow to adopt them so far.<sup>165</sup>

#### CONCLUSION

Moral hazard in insurance markets is a primary concern of regulators and insurers, yet accurately predicting how the theoretical phenomenon plays out in the real world remains a challenging exercise. This Article adds to our understanding by showing empirically that policyholders react to valued policy laws in the opposite way that moral hazard theory predicts. Although the causal link's precise contours cannot be known without further exploration, this study nevertheless offers useful information not only for appropriately setting state homeowners insurance regulatory policy, but also for updating the rational economic actor model to fit better the information that individuals actually incorporate into their decisionmaking.

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<sup>163</sup> See *supra* notes 37–48 and accompanying text.

<sup>164</sup> For examination of the effects when these regulatory approaches culminate in oscillating regulatory policies, see Peter Molk & Arden Rowell, *Reregulation and the Regulatory Timeline*, 101 IOWA L. REV. 1497 (2016).

<sup>165</sup> See, e.g., Daniel Schwarcz, *supra* note 139, at 1463 (urging increased regulatory oversight of insurance contracts based on “investigat[ing] competing empirical considerations.”)

## APPENDIX A: METHODOLOGY

*Cross-Sectional Comparison Specification.* When analyzing whether valued policy laws are associated with a change in homeowner fire rates, I estimate the following specification at the claim level:

$$Claim_{i,s,t} = \alpha + \theta_t + \mu_s + \gamma_{s,t} + \beta_2 X_{s,t} + \varepsilon_{i,s,t} \quad (1)$$

where  $i$  indexes claims,  $s$  and  $t$  denote the state (or region, depending on the model being estimated) and year-month of claim  $i$ , and  $Claim_{i,s,t}$  is an indicator variable that takes the value of 1 if claim  $i$  is due to fire or smoke, and 0 otherwise. Year-month fixed effects for the date of the claim are specified by  $\theta_t$  to incorporate nationwide fixed differences in fire rates across year-month combinations. State or region fixed effects, depending on the model being estimated, are specified by  $\mu_s$  to incorporate localized fixed differences in fire rates for the entire sample. State or region yearly fixed effects, depending on the model being estimated, are specified by  $\gamma_{s,t}$  to incorporate localized fixed differences in fire rates that vary by year.  $X_{s,t}$  is a vector of variables, consisting of indicator variables that specify whether the state has a valued policy law and that describe the foreclosure process, and time-varying non-indicator covariates specific to each state including the percentage change in construction costs, the percentage change in housing prices, the percentage change in income per capita, the log of the unemployment rate, and the log of the housing vacancy rate. Because the existence of a valued policy law and the foreclosure process are (except for Louisiana) invariant over the time period under analysis, valued policy law and foreclosure indicator variables are included only for those models without state fixed effects; models specifying state fixed effects will subsume these variables within the state fixed effects.

*Basic Difference-in-Differences Specification.* When analyzing the basic effect of Louisiana's valued policy law elimination on fire claims, I estimate the following specification at the claim level:

$$Claim_{i,s,t} = \alpha + \theta_t + \mu_s + \beta_1 (Post_i * LA_i) + \beta_2 X_{s,t} + \varepsilon_{i,s,t} \quad (2)$$

where  $i$  indexes claims,  $s$  and  $t$  denote the state and year-month of claim  $i$ , and  $Claim_{i,s,t}$  is an indicator variable that takes the value of 1 if claim  $i$  is due to fire or smoke, and 0 otherwise. Year-month fixed effects for the date of the claim are specified by  $\theta_t$  to incorporate fixed nationwide differences in fire rates across year-month combinations, while state fixed effects are specified by  $\mu_s$  to incorporate fixed differences in fire rates across states.  $Post_i$  is an indicator variable for whether claim  $i$  occurred on or after May 21, 2008.  $LA_i$  is an indicator variable specifying whether claim  $i$  comes from Louisiana.  $X_{s,t}$  is a vector of variables, consisting of indicator variables describing the state's foreclosure process and time-

varying covariates specific to each state including the percentage change in construction costs, the percentage change in housing prices, the percentage change in income per capita, the log of the monthly unemployment rate, and the log of the monthly housing vacancy rate.

$\beta_1$  is the coefficient of interest, representing the extent to which Louisiana's abrogation of its valued policy law is associated with differential odds of a claim being due to fire. Positive estimates suggest that eliminating the valued policy law increases the odds of a particular claim's cause being fire, holding other factors constant and assuming no unobservable variations in claim activity that are correlated with Louisiana's post-*Landry* time period.

*Dynamic Difference-in-Differences Specification.* When analyzing how Louisiana's relative fire claim odds vary on a yearly basis, I estimate the following specification at the claim level:

$$\begin{aligned}
 Claim_{i,s,t} = & \alpha + \theta_t + \mu_s + \sum_{j=2003}^{2011} \beta_j(d_t * LA_i) + \beta_{pre}(pre_i * LA_i) \\
 & + \beta_{post}(post_i * LA_i) + \beta_2 X_{s,t} + \varepsilon_{i,s,t}
 \end{aligned} \tag{3}$$

where  $d_{i,t}$  is an indicator variable for whether claim  $i$  falls within the twelve-month period ending May 20 of year  $j$  (chosen to correspond with the *Landry* decision issued May 21, 2008),  $pre_i$  is an indicator variable for whether claim  $i$  falls within the residual sample period preceding May 21, 2002 (namely, January 1 through May 20 2002), and  $post_i$  is an indicator variable for whether claim  $i$  falls within the residual sample period following May 20, 2011 (May 21 through December 31 2011), with other variables as specified in the basic difference-in-differences specification.  $\beta_j$ ,  $\beta_{pre}$ , and  $\beta_{post}$  are the variables of interest, indicating Louisiana's relative odds of a claim's being due to fire or smoke for each twelve month period (or shorter, in the case of the pre- and post-period residuals.)

#### APPENDIX B: ADDITIONAL ANALYSIS, ROBUSTNESS TESTS

The Figures below subject the findings in the main text to a series of alternative specifications to gauge the sensitivity of the results to the specifications presented in the main text.

##### Cross-Sectional Comparison Results

Table 1 in the main text presented the impact on log-odds for states with and without valued policy laws, among other variables. To get a sense for the change in fire claim probabilities, rather than fire claim odds,

Table A1 calculates the marginal effects for valued policy laws for both Models (1) and (2) of Table 1. The marginal impacts are calculated holding all other variables at their means.

Table A1  
Marginal Effects of Valued Policy Law for Cross-Sectional Regression

	(1)	(2)
Non-Valued Policy Law States	28.0%	27.8%
Valued Policy Law States	24.3%	24.4%

Estimates report the predicted probability of a claim being a fire or smoke claim, using the estimates from Models (1) and (2) of Table 1 and holding other values at their means.

Table 1 in the main text also used a 12-month window for the housing price and construction cost price changes. Tables A2 and A3 replicate the analysis of the first two models in Table 1, varying the length of time over which the housing price and construction cost indexes are measured.

Table A2  
Robustness Test of Table 1, Model (1), Varying Time Indexes

	(1)	(2)	(3)	(4)
	-----Total Sample-----			
	1 mo.	3 mo.	6 mo.	12 mo.
Valued Policy Law	-0.194** (0.083)	-0.192** (0.082)	-0.198** (0.082)	-0.193** (0.080)
Construction Cost Change	0.011 (0.008)	0.018** (0.008)	-0.021 (0.015)	0.000 (0.012)
Housing Price Change	-0.046 (0.064)	-0.015 (0.026)	-0.013 (0.014)	-0.014** (0.006)
Income per Capita Growth Rate (12 month)	-0.001 (0.018)	-0.001 (0.019)	0.002 (0.019)	0.010 (0.014)
Unemployment Rate (Log)	0.060 (0.145)	0.056 (0.146)	0.032 (0.145)	-0.034 (0.151)
Housing Vacancy Rate (Log)	-0.230** (0.100)	-0.229** (0.108)	-0.244** (0.101)	-0.303*** (0.084)
Foreclosure Terms				
Deficiency: Most Borrower Friendly	0.202 (0.209)	0.202 (0.209)	0.201 (0.211)	0.187 (0.217)
Deficiency: Med. Borrower Friendly	0.105 (0.158)	0.104 (0.159)	0.113 (0.157)	0.128 (0.152)
Deficiency: Least Borrower Friendly	0.070 (0.157)	0.068 (0.157)	0.077 (0.157)	0.080 (0.155)
Nonjudicial Foreclosure	-0.055 (0.083)	-0.055 (0.083)	-0.060 (0.083)	-0.065 (0.082)
Redemption Right Allowed	-0.051 (0.085)	-0.046 (0.084)	-0.061 (0.083)	-0.051 (0.083)
<i>N</i>	4,095,435	4,095,435	4,095,435	4,095,435
Region Fixed Effects	Y	Y	Y	Y
Region-Year Fixed Effects	N	N	N	N
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke versus other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

Table A3  
Robustness Test of Table 1, Model (2), Varying Time Indexes

	(1)	(2)	(3)	(4)
	-----Total Sample-----			
	1 mo.	3 mo.	6 mo.	12 mo.
Valued Policy Law	-0.173** (0.079)	-0.171** (0.079)	-0.177** (0.079)	-0.175** (0.078)
Construction Cost Change	0.009 (0.007)	0.016* (0.008)	-0.026* (0.015)	-0.006 (0.011)
Housing Price Change	0.008 (0.045)	0.010 (0.022)	0.006 (0.014)	-0.000 (0.006)
Income per Capita Growth Rate (12 month)	-0.003 (0.011)	-0.005 (0.012)	-0.006 (0.013)	-0.003 (0.012)
Unemployment Rate (Log)	0.119 (0.173)	0.125 (0.175)	0.125 (0.176)	0.113 (0.182)
Housing Vacancy Rate (Log)	-0.273*** (0.083)	-0.260*** (0.084)	-0.260*** (0.082)	-0.278*** (0.078)
Foreclosure Terms				
Deficiency: Most Borrower Friendly	0.165 (0.204)	0.167 (0.203)	0.172 (0.203)	0.165 (0.206)
Deficiency: Med. Borrower Friendly	0.110 (0.152)	0.105 (0.153)	0.110 (0.152)	0.113 (0.151)
Deficiency: Least Borrower Friendly	0.064 (0.149)	0.061 (0.149)	0.071 (0.149)	0.069 (0.149)
Nonjudicial Foreclosure	-0.066 (0.081)	-0.064 (0.080)	-0.068 (0.080)	-0.068 (0.080)
Redemption Right Allowed	-0.044 (0.081)	-0.040 (0.081)	-0.055 (0.080)	-0.050 (0.079)
<i>N</i>	4,095,435	4,095,435	4,095,435	4,095,435
Region Fixed Effects	Y	Y	Y	Y
Region-Year Fixed Effects	Y	Y	Y	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke versus other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

I also replicated the analysis of Tables 1 and 2 using a linear regression, with the monthly number of reported fire and smoke claims per 100,000 housing units as the dependent variable, as an additional robustness test of valued policy laws' impact. Tables A4 and A5 present the results. Because the comprehensiveness of insurer claims reporting may vary from month to month and state to state, this represents a noisier dependent variable specification than the logit models used in the main text. Monthly housing units were computed from the annual Census figures,<sup>166</sup> assuming linear changes from one month to the next. Because monthly numbers do not perfectly coincide with Louisiana's law change (on May 21, 2008), Louisiana's law change was treated as occurring on June 1, 2008 for purposes of Tables A4 and A5. The results are even stronger if the change is treated as occurring May 21, with the May 2008 claims converted into two separate monthly figures (from May 1 through May 20, inflating the per-housing unit fire claim number by 31/20, and from May 21 through May 31, inflating the per-housing unit number by 31/11), as shown in Tables A6 and A7.

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<sup>166</sup> *Housing Units Intercensal Estimates (2000-2010)*, CENSUS, <https://www.census.gov/popest/data/intercensal/housing/tables/HU-EST00INT-01.xls> and *Annual Estimates of Housing Units for the United States and States: April 1, 2010 to July 1, 2014*, CENSUS, <http://factfinder2.census.gov/bkmk/table/1.0/en/PEP/2014/PEPANNHU>.

Table A4  
Robustness Test of Table 1, Using Monthly Fire Claims per 100,000  
Households

	(1)	(2)	(3)	(4)
	-----Total Sample-----			
Valued Policy Law	-1.345 (0.841)	-1.355 (0.855)		
Construction Cost Change (12 month)	0.035 (0.071)	0.080 (0.091)	0.043 (0.070)	0.184 (0.117)
Housing Price Change (12 month)	0.039 (0.036)	0.043 (0.032)	0.030 (0.034)	0.116* (0.066)
Income per Capita Growth Rate (12 month)	-0.006 (0.045)	-0.139** (0.070)	0.021 (0.050)	-0.199* (0.106)
Unemployment Rate (Log)	2.067* (1.094)	2.531** (1.107)	0.131 (0.994)	0.702 (1.642)
Housing Vacancy Rate (Log)	0.109 (0.638)	-0.210 (0.614)	0.441 (0.600)	-0.681 (0.552)
Foreclosure Terms				
Deficiency: Most Borrower Friendly	1.762** (0.763)	1.700** (0.735)		
Deficiency: Med. Borrower Friendly	1.839*** (0.592)	1.793*** (0.587)		
Deficiency: Least Borrower Friendly	1.173 (0.909)	1.167 (0.898)		
Nonjudicial Foreclosure	0.439 (0.680)	0.393 (0.673)		
Redemption Right Allowed	0.533 (0.506)	0.508 (0.496)		
<i>N</i>	5,996	5,996	5,996	5,996
Region Fixed Effects	Y	Y	N	N
Region-Year Fixed Effects	N	Y	N	N
State Fixed Effects	N	N	Y	Y
State-Year Fixed Effects	N	N	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

Table A5  
Robustness Test of Table 2, Using Monthly Fire Claims per 100,000  
Households

	(1)	(2)	(3)	(4)
	No Valued Policy		Valued Policy	
	Law Only		Law Only	
Construction Cost Change (12 month)	0.100 (0.123)	0.225 (0.170)	0.205 (0.137)	0.195** (0.084)
Housing Price Change (12 month)	0.003 (0.045)	0.150* (0.080)	0.046 (0.091)	-0.053 (0.063)
Income Per Capita Growth Rate (12 month)	-0.038 (0.084)	-0.228 (0.147)	-0.071 (0.095)	-0.149 (0.117)
Unemployment Rate (Log)	-0.710 (1.760)	0.869 (1.801)	3.452** (1.383)	0.701 (0.984)
Housing Vacancy Rate (Log)	-0.956 (0.858)	-0.912 (0.891)	0.364 (1.490)	0.641 (0.391)
<i>N</i>	3,716	3,716	2,280	2,280
State Fixed Effects	Y	Y	Y	Y
State-Year Fixed Effects	N	Y	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over combinations over time.

Table A6  
Robustness Test of Table 1, Using Monthly Fire Claims per 100,000  
Households, Pro-Rating Claims in May 2008

	(1)	(2)	(3)	(4)
	-----Total Sample-----			
Valued Policy Law	-1.439*	-1.398*		
	(0.807)	(0.817)		
Construction Cost Change (12 month)	0.028	0.074	0.042	0.183
	(0.070)	(0.090)	(0.069)	(0.116)
Housing Price Change (12 month)	0.037	0.043	0.029	0.115*
	(0.036)	(0.032)	(0.033)	(0.066)
Income per Capita Growth Rate (12 month)	0.004	-0.130*	0.023	-0.197*
	(0.046)	(0.070)	(0.050)	(0.106)
Unemployment Rate (Log)	2.088*	2.517**	0.144	0.719
	(1.089)	(1.086)	(0.990)	(1.633)
Housing Vacancy Rate (Log)	0.125	-0.185	0.441	-0.682
	(0.627)	(0.601)	(0.597)	(0.548)
Foreclosure Terms				
Deficiency: Most Borrower Friendly	1.826**	1.761**		
	(0.755)	(0.730)		
Deficiency: Med. Borrower Friendly	1.910***	1.883***		
	(0.554)	(0.546)		
Deficiency: Least Borrower Friendly	1.222	1.235		
	(0.852)	(0.840)		
Nonjudicial Foreclosure	0.481	0.424		
	(0.674)	(0.669)		
Redemption Right Allowed	0.502	0.493		
	(0.504)	(0.494)		
<i>N</i>	6,046	6,046	6,046	6,046
Region Fixed Effects	Y	Y	N	N
Region-Year Fixed Effects	N	Y	N	N
State Fixed Effects	N	N	Y	Y
State-Year Fixed Effects	N	N	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time.

Table A7  
Robustness Test of Table 2, Using Monthly Fire Claims per 100,000  
Households, Pro-Rating Claims in May 2008

	(1)	(2)	(3)	(4)
	No Valued Policy		Valued Policy	
	Law Only		Law Only	
Construction Cost Change (12 month)	0.006 (0.108)	0.204 (0.164)	0.091 (0.059)	0.183** (0.090)
Housing Price Change (12 month)	0.035 (0.044)	0.112 (0.083)	0.010 (0.035)	0.023 (0.082)
Income Per Capita Growth Rate (12 month)	0.001 (0.069)	-0.209 (0.137)	0.058 (0.054)	-0.062 (0.105)
Unemployment Rate (Log)	1.066 (1.653)	1.667 (2.772)	-0.647 (0.827)	-0.964 (1.459)
Housing Vacancy Rate (Log)	0.578 (1.002)	-1.020 (0.848)	0.141 (0.478)	0.134 (0.466)
<i>N</i>	3,791	3,791	2,255	2,255
State Fixed Effects	Y	Y	Y	Y
State-Year Fixed Effects	N	Y	N	Y
Year-Month Fixed Effects	Y	Y	Y	Y

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over combinations over time.

#### *Difference-in-Differences Analysis*

Table 3 in the main text presented the impact on log-odds for Louisiana's change in valued policy law. To get a sense for the change in fire claim probabilities, Tables A8, A9, and A10 calculate the marginal effects of a change in various variables from the models in Table 3. The marginal impacts are calculated holding all other variables at their means.

Table A8  
Marginal Effects of Variable Changes for Difference-in-Differences  
Regression, Mississippi/Texas

	-----Region-----			Diff. LA vs. Non-LA
	All	Louisiana	Non-LA	
Time Period				
All	20.7%	35.5%	19.3%	16.2%
Pre-Landry (2002 to May 21, 2008)	21.5%	17.7%	22.6%	-4.9%
Post-Landry (May 21, 2008 to 2011)	19.9%	24.2%	18.8%	5.4%
Difference Post vs. Pre	-1.6%	6.5%	-3.8%	

Estimates report the predicted probability of a claim being a fire or smoke claim, using the estimates from Model (1) of Table 3 and holding other values at their means.

Table A9  
Marginal Effects of Variable Changes for Difference-in-Differences  
Regression, Arkansas/Mississippi/Texas

	-----Region-----			Diff. LA vs. Non-LA
	All	Louisiana	Non-LA	
Time Period				
All	21.7%	20.7%	21.8%	-1.1%
Pre-Landry (2002 to May 21, 2008)	22.7%	18.3%	23.7%	-5.4%
Post-Landry (May 21, 2008 to 2011)	20.5%	25.6%	19.5%	6.1%
Difference Post vs. Pre	-2.2%	7.3%	-4.2%	

Estimates report the predicted probability of a claim being a fire or smoke claim, using the estimates from Model (2) of Table 3 and holding other values at their means.

Table A10  
Marginal Effects of Variable Changes for Difference-in-Differences  
Regression, All Valued Policy Law States

	-----Region-----			Diff. LA vs. Non-LA
	All	Louisiana	Non-LA	
Time Period				
All	25.2%	24.3%	25.2%	-0.9%
Pre-Landry (2002 to May 21, 2008)	27.1%	18.0%	29.4%	-11.4%
Post-Landry (May 21, 2008 to 2011)	23.2%	34.1%	21.0%	13.1%
Difference Post vs. Pre	-3.9%	16.1%	-8.4%	

Estimates report the predicted probability of a claim being a fire or smoke claim, using the estimates from Model (3) of Table 3 and holding other values at their means.

Table 3 in the main text also used a 12-month window for the housing price and construction cost price changes. Table A11 replicates the analysis of Table 3, varying the length of time over which the housing price and construction cost indexes are measured.

Table A11  
Difference-in-Differences Test of Table 3

	(1)	(2)	(3)
Difference-in-Difference Coefficient Estimate			
1 month	0.285*** (0.040)	0.278*** (0.040)	0.423*** (0.058)
3 month	0.260*** (0.040)	0.261*** (0.032)	0.423*** (0.059)
6 month	0.206*** (0.060)	0.210*** (0.054)	0.420*** (0.058)
12 month	0.211*** (0.028)	0.226*** (0.031)	0.438*** (0.052)
<i>N</i>	436,354	467,932	1,398,757
Comparison States	Mississippi, Texas	Arkansas, Mississippi, Texas	All Valued Policy Law States

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on log-odds of a reported loss being due to fire or smoke relative to other loss sources. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time. All regressions include state and year-month fixed effects and control for the non-judicial foreclosure explanatory variables of Figures 4 and 5.

I also replicated the analysis of Table 3 using a linear regression, with the monthly number of reported fire and smoke claims per 100,000 housing units as the dependent variable, as an additional robustness test of valued policy laws' impact. Table A12 presents the results. Because monthly numbers do not perfectly coincide with Louisiana's law change (on May 21, 2008), the change was treated as occurring on June 1, 2008. The results are similar if the change is treated as occurring May 21, with the May 2008 claims converted into two separate monthly figures (from May 1 through May 20, inflating the per-housing unit fire claim number by 31/20, and from May 21 through May 31, inflating the per-housing unit number by 31/11), as shown in Table A13.

Table A12  
 Robustness Test of Table 3, Using Monthly Fire Claims per 100,000  
 Households

	(1)	(2)	(3)
Difference-in-Difference Coefficient Estimate	1.912*** (0.378)	1.748*** (0.332)	1.263*** (0.404)
<i>N</i>	360	480	2,280
Comparison States	Mississippi Texas	Arkansas Mississippi Texas	All Valued Policy Law States

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time. All regressions include state and year-month fixed effects and control for the non-judicial foreclosure explanatory variables of Tables 1 and 2.

Table A13  
 Robustness Test of Table 3, Using Monthly Fire Claims per 100,000  
 Households, Pro-Rating Claims in May 2008

	(1)	(2)	(3)
Difference-in-Difference Coefficient Estimate	1.892*** (0.351)	1.752*** (0.315)	1.286*** (0.398)
<i>N</i>	363	484	2,299
Comparison States	Mississippi Texas	Arkansas Mississippi Texas	All Valued Policy Law States

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Estimated coefficients measure the impact on the number of monthly fire or smoke claims per 100,000 housing units. Robust standard errors are reported in parentheses and are clustered at the state-month level to correct for autocorrelation by state/month combinations over time. All regressions include state and year-month fixed effects and control for the non-judicial foreclosure explanatory variables of Tables 1 and 2.

#### *Dynamic Difference-in-Differences Analysis*

Figure 5 used all non-Louisiana valued policy law states as the comparison group for the dynamic difference-in-difference analysis. The Figures below replicate the dynamic difference-in-differences analysis of Figure 5, varying the control groups to which Louisiana's claims experience is compared.

Figure A1  
 Dynamic Difference-in Differences Estimates  
 Louisiana vs. Mississippi/Texas

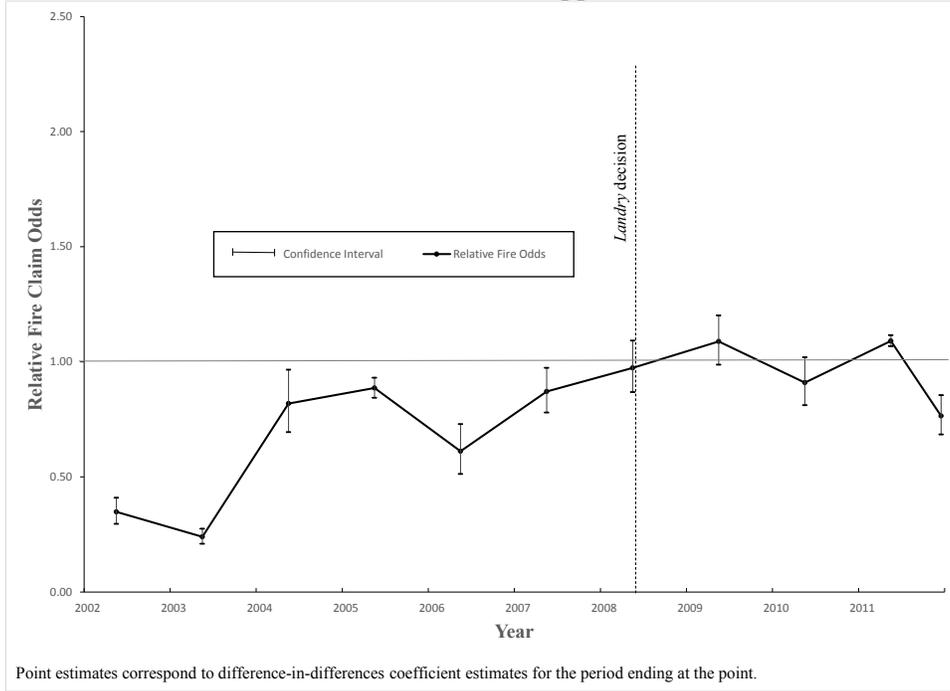


Figure A2  
 Dynamic Difference-in Differences Estimates  
 Louisiana vs. Arkansas/Mississippi/Texas

