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IMPLICATIONS FOR STACKED INSURANCE IN PENNSYLVANIA FOLLOWING  
GALLAGHER V. GEICO (2019)

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## ABSTRACT

A class action lawsuit has already begun to form following the decision of *Gallagher v. GEICO (2019)*. In their decision, the Court deemed that the Household Vehicle Exclusion (versions of which are contained in largely all stacked insurance policies) violated the Motor Vehicle Financial Responsibility Law; that is, insureds were unfairly paying for a coverage which they could not receive. *Gallagher* did not happen in a bubble; it was the result of decades of previous stacked insurance cases in Pennsylvania and ultimately made possible by the plurality decision of *GEICO v. Ayers (2008)* eleven years earlier. Although courts have historically expressed a tendency to favor the disadvantaged party within a given contract of adhesion, *Gallagher's* decision now precedentially states that insureds will be indemnified with stacked benefits when they have paid a premium and sustained damages in excess of the involved vehicle's limit. It is crucial now more than ever that an insurer accurately prices stacked insurance. This begins by adopting ISO policy language to reduce risk of lawsuit arising from contract ambiguity. Then, the current pricing models must be changed to reflect the right of an individual to receive inter-policy stacking benefits. This is accomplished by first removing any relevant systems barriers, then by modeling the probability an insurer pays a stacked claim using a time series.

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I'd like to thank my father for funding my very expensive caffeine habit.

## Chapter 1

### A History of Stacked Insurance

#### *Uninsured (UM) and Underinsured (UIM) Motorists*

New Hampshire is the only state<sup>1</sup> to not explicitly require an individual to hold auto-liability insurance; even there, the driver cannot legally operate a motor vehicle without first demonstrating the ability to pay in the event of an at-fault accident. The penalties for driving without this coverage vary by jurisdiction and range from fines to jail time. Despite these countrywide regulations, a significant population of **uninsured motorists** (UMs) remains.

The Financial Responsibility and Insurance Committee found the primary motivation among UMs to be a lack of funds. Likewise, many Americans may not purchase adequate coverage for their risk level. These **underinsured motorists** (UIMs) are not driving illegally, but pose a similar threat to UMs: insufficient payment to another party in the event of an at-fault accident.

It is reasonable to assume that both UMs and UIMs exist across the United States, and this paper is not intended to fully diagram their frequencies. To create an understanding of and motivate the subsequent discussion, a brief study of UMs is conducted immediately below, with the caveat that the true proportion of drivers without adequate coverage - in the state of Pennsylvania and countrywide - is even higher.

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<sup>1</sup> All countrywide references to states include the District of Columbia (D.C.)

The Insurance Information Institute provides annual estimations of uninsured motorists in the United States and periodically reports on the corresponding figures by state.<sup>2</sup> Since complete data is not accessible for each individual state, a series of one-sample t-tests ( $df = 3$ ; reject  $H_0$  if  $p < 0.05$ ) were performed in R to ascertain if UM by state could be expressed as a proportion of the national average. The lowest p-value for each of the 51 states was greater than 0.95,<sup>3</sup> thereby confirming without doubt that it is reasonable to predict the %UM by state using the abovementioned methodology. This assumption is critical to the analysis discussed in later sections of this chapter.

In 1993, uninsured motorists represented an all-time high of 16% of drivers in the United States. Although the proportion has not been reached since, the past two decades have seen fluctuations in %UM between 12.3% in 2010 and 15.1% in 2003. A gradual downward slope is clearly evidenced by a plot of the data (Exhibit A).

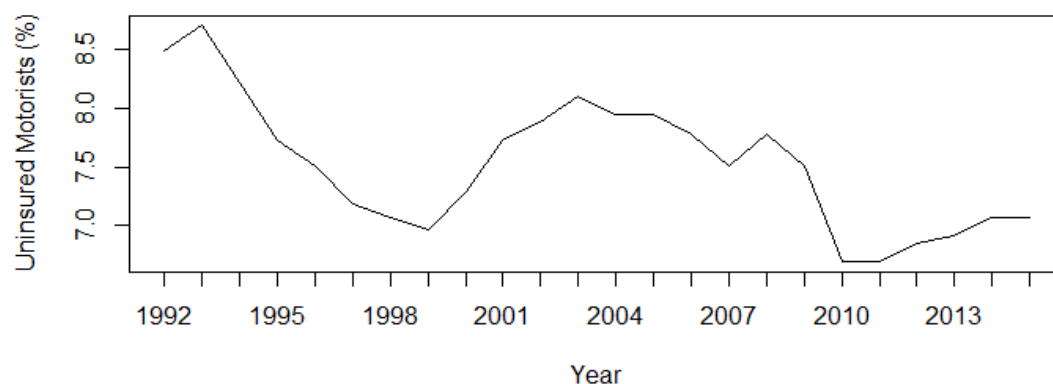
Although this visual gives perspective on historical trends, future projection of %UM is beyond the scope of this paper. Of relevance is the undeniable presence and impact of uninsured motorists across the country. When a driver gets into an accident with an uninsured motorist - particularly one in which the UM is at fault - the not-at-fault (NAF) driver runs the risk of not receiving adequate payment. While not applicable to vehicular damage, medical treatment necessitated by the accident may be rendered unaffordable, thereby impacting the health of motorists.

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<sup>2</sup> Data available from 1992 - 2015

<sup>3</sup>  $p = 0.9505406$  and corresponds to the state of Missouri

**Figure 1 Percentage of Uninsured Motorists in Pennsylvania by Year**



The Pennsylvania Department of Transportation enforces the following:<sup>4</sup>

“If you are stopped for a moving violation and it is determined that you are operating your vehicle without insurance, you could face the following penalties and expenses:

- A minimum of \$300 fine for driving uninsured
- A three-month suspension of your vehicle registration
- A three-month suspension of your driver’s license
- Restoration fees to restore your vehicle registration
- Restoration fees to restore your driver’s license
- Vehicle impoundment

In addition, your vehicle may not be driven by anyone while the registration is suspended.”

Furthermore, Pennsylvania’s Assigned Risk Plan was created to minimize the number of UMs in the state by providing automobile insurance to those who would be otherwise financially

<sup>4</sup> Taken directly from the Pennsylvania Department of Transportation’s Automobile Insurance Guide Pennsylvania Insurance Department. *Questions and Answers about Automobile Insurance in Pennsylvania*. Pennsylvania Insurance Department



incapable. It is required that any insurance company writing business in the state participate in the plan, and qualifying **insureds** are proportionally assigned to **insurers** based on their relative volume of business. Despite the state's laws and aid programs, however, Pennsylvania has realized an average rate of 7.52% of uninsured motorists between 1992 and 2015.<sup>5</sup>

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<sup>5</sup> This number was obtained by calculating uninsured motorists in Pennsylvania as an average proportion of the country and multiply by the national, annually-available figures. The t-test discussed earlier in this section (results in Appendix A) certifies that this is an appropriate estimation technique.

### *Uninsured and Underinsured Motorist Insurance*

Thus far, the discussion has focused on establishing the issue of, and threats associated with, UMs and UIMs. A driver may seek protection against these motorists in the form of UM/UIM insurance, both of which are offered - but not required<sup>6</sup> - in Pennsylvania.<sup>7</sup> An insured with UM insurance would receive a payout from their insurer in the event of an accident with an uninsured motorist, conditional upon the latter being the at-fault party. Inability to determine the motorist's identity (i.e., a hit-and-run) also qualifies the insured to UM benefits.

Insurers are challenged with mitigating **moral hazards** inevitably arising out of the elusiveness of hit-and-run vehicles. Because the alleged **tortfeasor's** vehicle is unknown, an insurer will not be able to fully confirm the victim's story. Insureds, for the large part, are aware of this; inevitably, then, some choose to commit insurance fraud, reporting physical damages or bodily injuries that were not the fault of another negligent driver, but of themselves.

Some insureds may attempt to obscure the true nature of the accident. For instance, if a negligent driver drove into a lamppost, he might report to his insurance company that the damage was inflicted by another driver who fled the scene. Taking this story face-value, the insured is eligible for UM benefits when, in fact, an external party was not involved. In other cases, a driver responsible for inflicting bodily damage onto another may purposefully drive their car into a lamppost, fleeing the scene of the original accident in an attempt to convince authorities and insurers that the vehicle's damages were caused in the secondary "accident" and, consequently, are unrelated to the original accident.

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<sup>6</sup> A number of states require drivers to hold UM/UIM insurance, but they are beyond the scope of this paper and consequently omitted from discussion.

<sup>7</sup> It should be noted that UM insurance was required and UIM insurance was effectively nonexistent until *Davis v. GEICO (1982)*. This case will be thoroughly discussed in Chapter 2, Subchapter 1: The Motor Vehicle Financial Responsibility Law.

Because of the nature of hit-and-run accidents, these claims are particularly susceptible to exaggeration or complete fabrication. Apart from impacting the insurer - who is liable for paying these claims - falsely-reported accidents impact insurers throughout the state. The National Insurance Crime Bureau reports that “fraud cause[s] higher premiums for all of us, but [it] also raises our taxes and inflates prices for consumer goods”.<sup>8</sup> Fraud, therefore, impacts nearly every aspect of our lives. While it is necessary to provide underinsured motorist coverage for hit-and-run accidents, the moral hazards present with this type of coverage are irrefutably abundant.

Insurers have a few methods to limit the frequency and severity of these false claims. For example, the Pennsylvania Insurance Fraud Prevention Authority does as its name implies. Their mission and strategy towards combating insurance fraud, as stated on their website, is three-fold: (1) help law enforcement in Pennsylvania identify and fight fraud, (2) educate the public to reduce frequency of fraud through awareness, and (3) inform state politicians (i.e., the governor and legislators) to address the problem through legislative action.

Achieving this mission is made possible and facilitated largely by the Insurance Fraud Prevention Authority. Passed in 1995, the IFPA is proportionally funded by insurers throughout the state of Pennsylvania and delegates funds toward paying fraudulent claims, should they occur. Essentially, the IFPA created provisions that act as insurance for insurers against insurance fraud. Many insurance companies further supplement the IFPA Investigative Units, groups of employees “whose sole mission is to detect, deter, and defeat insurance fraud.”<sup>9</sup>

UIM coverage is invoked when the tortfeasor is insured with limits that are inadequate to cover the extent of the victim’s injuries. This requires that the tortfeasor holds automobile

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<sup>8</sup> National Crime Insurance Bureau. “Prevent Fraud & Theft.” *National Insurance Crime Bureau*

<sup>9</sup> GEICO. “Fighting Insurance Fraud.” *GEICO's Special Investigations Unit*.

insurance to begin with. In the event that the at-fault party cannot be identified (as is the case with hit-and-run accidents) or does not carry any funds, UM coverage is applicable. This distinction is crucial and the origin of UIM versus UM benefits is discussed at length in Chapter 2 through analysis of *Davis v. GEICO (1982)*.

Although UM payout is from the victim's policy, it is not considered a first-party coverage. The tortfeasor's actions and their insufficient or nonexistent insurance spur the need for supplementary UIM or UM benefits, respectively; consequently, it is more appropriate to classify these as third-party coverages. The invocation of UM/UIM is contingent upon the liability of the third-party with the insurer paying only if the tortfeasor is legally liable as the result of a direct claim. This important stipulation will be discussed further in *Contracts of Adhesion & Court Indemnification* later this chapter.

*Stacked Insurance as a Supplement to UM and UIM Insurance*

**Stacked insurance** supplements UM/UIM policies by allowing the insured to combine coverage from multiple policies. To begin our understanding, consider a scenario in which more than one vehicle is insured under one policy held by Driver X. Vehicle A has a theoretical underinsured motorist limit of \$100, and Vehicle B's is \$200. In addition to the premiums paid toward each vehicle, Driver X has opted not to waive his right for stacked coverage and pays an additional premium for these benefits.<sup>10</sup>

While driving Vehicle A, the insured is hit by Driver Y. The liability limits on Driver Y's car are paid in full to the driver of Vehicle A, but are not sufficient to cover all of Driver X's injuries. This triggers the implementation of underinsured motorist benefits on Vehicle A, the automobile involved in the accident; unfortunately, Driver X was severely injured, so the \$100 of UIM on Vehicle A still do not pay for all bodily damages. Since Driver X had paid for stacking on his vehicles, he is also entitled to the \$200 limit on Vehicle B. Thus, the total UIM payout from Driver X's insurer is  $\$100 + \$200 = \$300$ .

This simple example plainly motivates the purpose of stacked UM/UIM for insureds; however, it also illustrates a potentially massive increase in liability for the insurer; instead of being liable for \$100 or \$200 on Vehicles A and B, respectively, the company is responsible for awarding up to \$300 on the involved automobile if the insured's injuries exceed the primary vehicle's limits. Although \$300 is relatively small in the context of multi-billion dollar insurance

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<sup>10</sup> It must be noted that Pennsylvania law requires insurers to charge an increased premium for stacked insurance and that it must be offered in every scenario. Historically, when insurers have dealt with a client who holds insurance on a policy with only one vehicle, they have assumed that this precluded the insured from receiving stacked insurance benefits. Reconciling this with the state statute, insureds have charged a trivial amount; that is, their expected payout in these cases is 0, but they are legally required to charge something and so increase the premium by a matter of dollars.

companies, recall that actual amount of coverage per vehicle vastly exceeds our motivating example with traditional policies providing between \$25,000 and \$50,000 of potential benefits. The stacking of additional vehicles, then, leaves the insurance company susceptible to millions of dollars of underinsured motorist benefits a year, much of which will be paid to vehicles not primarily involved in the accident which caused the damage.

For this reason, stacked insurance is only offered in the 15 states in which it is required by the Departments of Insurance.<sup>11</sup> Charging the appropriate premium to combat the - albeit low frequency - high severity losses arising from stacked policies is crucial to the financial wellbeing of an insurer. The decision of *Gallagher v. GEICO (2019)* is the subject of later chapters and the stimulus for this paper. It grossly impacts how insurers must consider and adequately charge for an insured's ability to stack across vehicle types.

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<sup>11</sup> The complete list of these states is as follows: Alabama, Colorado, Florida, Iowa, Kentucky, Mississippi, Missouri, Montana, New Mexico, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, and Wyoming.

### *Contracts of Adhesion & Court Indemnification*

In Pennsylvania, insurance companies are required to provide stacked insurance unless the insured chooses to knowingly waive their right using an approved waiver.<sup>12</sup> This statute is so designed in response to insured vulnerability. Many insurance contracts are **Contracts of Adhesion** with the dominant party being the writer, the insurer. These Contracts are standardized and given to insureds on a take-it-or-leave-it basis; that is, a potential insured may not contest any of the provisions put forth within the contract.

Insurers prefer to use Contracts of Adhesion because they allow for the more efficient allocation of nearly all relevant resources. Insureds are generally pleased with these accelerated proceedings, as online “click through” contracts are highly convenient and made possible by these standardizations. Insurers also reap benefits from using these contracts. Not needing to draft new contracts for each new potential insured is much cheaper and easier than the alternative. Further, the standardization of these contracts minimizes the delegated legal resources because court precedence is easily extended across cases wherein policy language is consistent. Companies consequently find themselves saving time and money by offering something more convenient to their clients.

Despite their efficiency, Contracts of Adhesion have been the source of many legal disputes between insurers and insureds. Because insureds are unable to contest any policy provisions, courts tend to empathize and side with the insureds over the insurers. Of course, juries cannot blindly favor insureds if the insurance company has clearly stated the policy

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<sup>12</sup> This concept will be more thoroughly investigated in Chapter 2.

expectations void of ambiguities. As it turns out, nearly all contracts contain phrasings or provisions with the potential to confuse the layperson.

The **Doctrine of Reasonable Expectations** was coined by Professor Robert E. Keeton in 1970. Because of the highly standardized and clinical wording of insurance contracts, Keeton claimed that insureds are placed at an inherent disadvantage. Consequently, “expectations of applicants and intended beneficiaries... will be honored *even though painstaking study of the policy provisions would have negated those expectations.*”<sup>13</sup> Keeton recognized - years before the implementation of precedential statute - that courts will favor insureds because they had a certain expectation for their coverage at the time of purchase that was apparently violated by certain exclusions imbedded in policy language. In fact, “under the doctrine [of reasonable expectations], courts often grant coverage to an insured even when the express language of the policy does not provide coverage.”<sup>14</sup> Insureds are also the disadvantaged party in a Contract of Adhesion, so their inability to oppose any provisions or phrasing within the policy further establishes them as the underdog.

Thus, when ambiguity is present in a policy, juries - sometimes implicitly - rely on Keeton’s Doctrine of Reasonable Expectations and sympathize with the clearly disadvantaged party with regards to the relevant contract of adhesion. An overwhelming majority of juries and judges feel sympathy for insureds and rule against the more powerful insurer, more thoroughly indemnifying the inferior party in a given Contract of Adhesion. This **indemnification** practice was legally solidified by *Standard Venetian Blind Co. v. American Empire Insurance Co. (1983)*,

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<sup>13</sup> Seno, David J. “The Doctrine of Reasonable Expectations in Insurance Law: What to Expect in Wisconsin.” *Marquette Law Review*, vol. 85, no. 3, 2002.

<sup>14</sup> Seno, David J. “The Doctrine of Reasonable Expectations in Insurance Law: What to Expect in Wisconsin.” *Marquette Law Review*, vol. 85, no. 3, 2002.



the decision of which stated that “where the provision of the policy is ambiguous, the policy provision is construed in favor of the insured and against the insurer.”<sup>15</sup>

Despite the courts’ tendencies to more thoroughly favor and indemnify insureds, however, there are limitations to the benefits an insured can receive under stacked insurance. *Marroquin v. Mutual Benefit Insurance Company (1991)* perfectly illustrates this concept. In 1989, Jose Marroquin was injured by his brother. Both brothers resided with their parents at the time of the accident. Mutual Benefit paid Jose the liability limits of Jorge’s policy, but Jose’s injuries exceeded the limit. When Jose filed for underinsured motorist benefits, Mutual Benefit refused.<sup>16</sup>

The Marroquins filed a lawsuit against their insurer, but the courts ultimately sided with Mutual Benefit. Since Jose and Jorge were residential family members and both insured under the same policy, Jose’s underinsured motorist benefits were essentially an extension of Jorge’s liability limits. Granting Jose these supplementary limits would be allowing the Marroquins to convert inexpensively-purchased underinsured motorist insurance into liability insurance. The courts noted that underinsured motorist insurance is meant to protect the insured from the situation where the tortfeasor’s policy is not substantial enough - that is, to protect the insured from a situation entirely out of their control. The Marroquins had it in their power to purchase higher limits of liability insurance but chose not to. The payout to which they claimed to be entitled was not supported by the purpose of underinsured motorist coverage.

Despite the tendency for Pennsylvania juries and judges to favor the insured when contemplating a case involving a Contract of Adhesion, underinsured motorist benefits will be

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<sup>15</sup> *Standard Venetian Blind Co. v. American Empire Insurance Co.*, A.2d 300, 300-321, (pa 1983).

<sup>16</sup> The defendant’s position was founded upon the “Family Liability Limitation” – comparable to the Household Vehicle Exclusion – the latter of which is explored in Chapter 2.

denied if the tortfeasor is a family member of the victim. The Marroquins represent a rare case in which the courts sided with an insurer whose argument was based on the **Household Vehicle Exclusion**; this and other relevant cases are the subject of Chapter 2.

## Chapter 2

### The Household Vehicle Exclusion in Pennsylvania

#### *The Motor Vehicle Financial Responsibility Law*

In December of 1982, the Supreme Court of Pennsylvania ruled in favor of the defendant in *Davis v. Government Employees Insurance Company*. GEICO denied Gus and Clare Davis uninsured motorist coverage following a head-on collision with another motor vehicle. The at-fault party, Michael McFadden, was insured at the state minimum (\$35,000) by Travelers Insurance Company, all of which was paid to the Davises. The amount was insufficient to cover all sustained injuries, which totalled over \$100,000.

The Davises held an Uninsured Motorist Policy with GEICO and filed to receive benefits under this policy. GEICO denied payment because McFadden was not uninsured; he was *underinsured*. As affirming Justice Roberts writes in his opinion, “notwithstanding appellant’s assertion that ‘uninsured’ is equivalent to ‘underinsured,’ the only common and approved meaning of the word ‘uninsured’ is having *no* insurance...”

At the time of the case, the Uninsured Motorist Coverage Law was the governing work with regards to Pennsylvanian uninsured motorists. The Law, however, did not include any provisions for the scenario in which the at-fault party held insurance at or above the amount required by the state but inadequate relative to the collective damages; that is, underinsured motorists were not acknowledged. As such, an insured was essentially better-off if the tortfeasor

held no insurance at all than if he held too little. This anomaly is what ultimately prevented the Davises from receiving payout from GEICO. It also highlighted the necessity for reevaluation of the law and inclusion of proceedings for underinsured motorists.

The result was Title 75, Chapter 17 of the Pennsylvania General Assembly which defines the state laws of vehicular accidents as they relate to financial responsibility and is aptly named the **Motor Vehicle Financial Responsibility Law** (MVFRL). Of particular relevance to this paper is Subchapter C: Uninsured and Underinsured Motorist Coverage; specifically, §1738<sup>17</sup> outlines regulations and procedure for the stacking of this insurance.

The MVFRL was enacted in 1984 and has since served as a benchmark for insurer-insured relationships. It unambiguously details the responsibility of a motorist to prove financial responsibility. This is most commonly done by holding an automobile insurance policy with state-minimum or above rates. Failure of a motorist to demonstrate financial responsibility results in their classification as an Uninsured Motorist.

The MVFRL also includes provisions which limit the power of insurance companies. Insurers are legally required to comply with the entirety of the MVFRL to ensure that insureds have access to adequate coverage without being financially abused. It is crucial that an insurer fully understands their responsibilities as outlined by the MVFRL. Insurers who fail to comply with statutory updates can be faced with class-action lawsuits and further “[t]he implications are that insurers that fail to keep current with statutory changes can face class-action lawsuits for failure to comply with the statute.

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<sup>17</sup> See Motor Vehicle Financial Responsibility Law §1738 in Appendix B

### *The Household Vehicle Exclusion*

The Household Vehicle Exclusion<sup>18</sup> is a provision incorporated into UM and UIM insurance policies by insurers. It states that “[t]his coverage does not apply to bodily injury while occupying or from being struck by a vehicle owned or leased by you or a relative that is not insured for Underinsured Motorists Coverage under this policy”.<sup>19</sup>

There are, evidently, severe ambiguities inherent in the Household Vehicle Exclusion. Despite the insurance companies’ attempts to be straightforward in their exceptions to coverage, the layperson is unable to tease out the true meaning from the intricacies in the policy language, which directly violates Keeton’s Doctrine of Reasonable Expectations (as discussed in Chapter 1).

Many court cases have been conducted in Pennsylvania to determine the dual enforceability of the Household Vehicle Exclusion and MVFRL; a relevant selection is analyzed in chronological order throughout the succeeding sections in this chapter. All cases presented below distinctly contribute to the decision of *Gallagher v. GEICO (2019)*, the motivation behind this thesis; yet, they all follow a similar archetype. That is, an insurer denies an insured access to stacked payout following an accident on the basis of the Household Vehicle Exclusion, at which point the insured appeals, claiming that this denial either (a) violates the MVFRL or (b) violates Keeton’s Doctrine of Reasonable Expectations. The decisions of the involved courts go to prove the assertion that insureds are thoroughly indemnified and sympathized with.

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<sup>18</sup> referred to as the “Exclusion” for brevity

<sup>19</sup> see Household Vehicle Exclusion in Appendix B

***Windrim v. Nationwide Mutual Insurance Company (1992)***

Allen Windrim was the sole owner and operator of his motor vehicle at the time he was allegedly struck by a hit-and-run driver in December of 1989. Windrim contacted Nationwide Mutual Insurance Company (Nationwide) and contended that he was entitled to his mother's Uninsured Motorist benefits as a resident of her household.

Nationwide denied Windrim payment under the Household Vehicle Exclusion. The company maintained that Windram was ineligible for compensation because he was in a non-insured vehicle owned by himself at the time of the accident. His mother's benefits would apply if Windram had been driving a car insured under the policy or if he had been a passenger in another vehicle driven by his mother.

Windrim appealed on the grounds that Nationwide's exclusionary provision defies §2000(a) of the Uninsured Motorist Act, Pa. S.A. As written by affirming Judge Hoffman, "The legislative intent of [the Uninsured Motorist Act] is to ensure owners/operators of uninsured vehicles receive uninsured motorist benefits".<sup>20</sup> By denying Windrim these benefits, Nationwide was in contempt with the law. The Exclusion was ultimately deemed in violation of the UMA and the MVFRL and the Court sided with the plaintiff.

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<sup>20</sup> Windrim v. Nationwide Ins. Co., 641 A.2d 129, 129-142 (pa 1994).

***Paylor v. Hartford Insurance Company (1994)***

In 1986, Fred and Betty Dymond were killed in a single-vehicle accident involving their motorhome. Janet Paylor was paid the liability limits under the Foremost Insurance Company policy as her parents' administratrix. She then sought payout from Hartford Insurance Company in the form of underinsured motorist insurance on three vehicles for which her parents were also named insureds. Hartford denied coverage because the three other vehicles were "owned by or furnished or available for the regular use of [the named insured] or any family member,"<sup>21</sup> i.e., because the Exclusion applied to Paylor's situation.

The Supreme Court of Pennsylvania relied on a litany of similar cases<sup>22</sup> in their decision to affirm Hartford's judgment. The underlying case facts were united by a common theme: following a single-vehicle accident, the insured attempted to recover underinsured motorist benefits from their insurer to supplement insufficient liability payments. The *Paylor* decision set precedent for such scenarios.

Janet Paylor was attempting to stack the liability benefits from her parents' motorhome with the underinsured motorist benefits from the non-involved automobiles. The judges determined that this was contrary to the purpose of UIM coverage which, as defined in *Wolgemuth v. Harleysville (1988)*, "is to protect the insured (and his additional insureds) from the risk that a negligent driver of another vehicle will cause injury to the insured (or his additional insureds) and will have inadequate coverage to compensate for the injuries caused by his negligence."<sup>23</sup>

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<sup>21</sup> *Paylor v. Hartford Ins. Co.*, 640 A.2d 583, 583-598 (pa 1994).

<sup>22</sup> Cases are not limited to Pennsylvania and include *Standard Venetian Blind Co. v. American Empire Insurance Co.* (1983), *Bateman v. Motorists Mutual Insurance Co.* (1991), and *Jeffrey v. Erie Insurance Exchange* (1993)

<sup>23</sup> *Wolgemuth v. Harleysville Mut Ins. Co.*, 535 A.2d 1145 (pa 1988).

Paylor was trying to convert the UIM insurance into more liability coverage, the former of which was purchased for a significantly lower premium than the latter.<sup>24</sup> Further, her parents were not subject to the negligence of another party; because it was a single-vehicle accident, liability payments were the only applicable benefits. The precedent set by *Paylor* asserts that an insured is not entitled to stack UIM and liability payments when they are the only party involved in an accident. The insured had full ability to purchase higher liability limits and cannot retroactively convert inexpensively-purchased UIM insurance into a relevant coverage.

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<sup>24</sup> Recall the similar decision of *Marroquin v. Nationwide (1991)*. If an insured requests underinsured motorist benefits following an accident involving only their or a residential family's vehicles, the insurer is well within their rights to deny this coverage. The insufficiency of liability limits is a problem generated by the insured and is not the result of another driver's negligence, financial or otherwise.



*McGovern v. Erie Insurance Group (2002)*

At the time of his accident, Ronald McGovern held a \$15,000-limit motorcycle policy with Progressive Casualty Insurance Company (“Progressive”). McGovern lived with his mother, further entitling him to the \$250,000 of UM/UIM benefits on her automobile policy as a resident relative of the named insured. Arbitrators assigned a value of \$665,000 to McGovern’s injuries, and a total of \$265,000<sup>25</sup> was ordered by the trial courts. McGovern appealed and asserted that he was owed a higher payout from Erie Insurance Group (“Erie”); specifically, he held that the \$250,000 applied to his mother’s vehicle should also be applied to his motorcycle and automobile via the stacked clauses in both the Progressive and Erie policies.

The Superior Court first referenced §1733 of the MVFRL in their decision, affirming that McGovern was entitled to recovery of benefits first on the motorcycle directly involved in the accident and secondarily on vehicles “not involved in the accident with respect to which the injured person is an insured.”<sup>26</sup> Thus, after McGovern collected the \$15,000 on his Progressive policy, he became eligible for payout under his mother’s Erie policy. Further, the stacked premiums paid by both on their respective policies ensured under §1738 that “when more than one vehicle is insured under one or more policies providing uninsured or underinsured motorist coverage... the limits of coverages available under this subchapter shall be the sum of the limits for each motor vehicle as to which the injured person is insured.”<sup>27</sup>

Even though McGovern was entitled to coverage from both Progressive and Erie, neither insurer was contractually expected or obligated to provide coverage for vehicles for which they

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<sup>25</sup> \$15,000 from Progressive for McGovern’s involved motorcycle and \$250,000 from Erie for his mother’s automobile under which McGovern is a named insured

<sup>26</sup> See Motor Vehicle Financial Responsibility Law §1733(a.2) in Appendix B.

<sup>27</sup> See Motor Vehicle Financial Responsibility Law §1738(a) in Appendix B.

were not paid a premium. “While McGovern and his mother both paid for stacked UIM coverage, neither McGovern nor his mother paid a premium to any one insurer for all three vehicles”<sup>28</sup>; that is, the three vehicles were not coherently stacked with each other by the same insurer, let alone under the same policy. The courts saw McGovern’s logic as fiscally unfair to Erie and Progressive and denied his plea for stacking. This reasoning was maintained in several succeeding cases, including, but not limited to, *Erie Insurance Exchange v. Baker* in 2009. It is steadfastly recognized that requiring an insurer to pay stacked insurance when the involved vehicle is not insured by their company is unfair and unlawful; this argument holds today.

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<sup>28</sup> McGovern v. Erie Insurance Group, A.2d (pa 2002).

***GEICO v. Ayers (2008)***

Jesse Ayers of Pittsburgh was involved in two accidents on July 29, 2004, both of which were caused by the same Chevrolet pick-up truck.<sup>29</sup> The first accident occurred while Ayers was operating his GEICO-insured motorcycle; the second happened while he was lying in the road prior to the arrival of an ambulance. Pirotta's liability limits were paid in full to Ayers but were not comprehensive. As with every other insured in this literature review, Ayers filed for underinsured motorist benefits to pay for his injuries. Because he had paid increased premiums, he asked to stack the coverage on his motorcycle with his auto policies.

GEICO uniquely ceded these supplementary benefits for the second accident *only*, denying stacked payment for the first accident because Ayers' occupation of the motorcycle precluded him from receiving payout under the Household Vehicle Exclusion. The final judgment landed in favor of GEICO with the concurring judges relevantly asserting that "[T]here is an important distinction between paying for something you cannot receive (e.g., paying for stacking in a policy which contains an exclusion of all stacking) and paying for something that all parties know is limited by the terms of the policy (e.g., the situation here where the household exclusion clause limits stacking only in certain situations and does not otherwise affect the insured's right to stack). The latter is contractually valid and not inconsistent with public policy."<sup>30</sup>

In the minds of the *Ayers* courts, Ayers had been paying for a coverage which he was able to receive except under a certain, narrow set of circumstances. These circumstances were, in this case, met; the Household Vehicle Exclusion precluded Ayers from collecting stacked

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<sup>29</sup> Driven and insured by David Pirotta ("Pirotta")

<sup>30</sup> Government Employees Insurance Company v. Ayers, A.2d (pa 2008).

benefits, but he would have been eligible if the events had unfolded differently (i.e., had Ayers been driving his pick-up truck at the time of the first accident). Although the decision landed in favor of GEICO, the judges were unable to uniformly justify *why* it was so. This earmarked *GEICO v. Ayers* as a non-precedential plurality decision and had serious implications for *Gallagher v. GEICO* fifteen years later.<sup>31</sup>

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<sup>31</sup> A subsection of Chapter 3 is devoted to understanding the repercussions of *Ayers*' plurality decision on *Gallagher*.

### **Chapter 3**

#### **Gallagher v. GEICO (2019)**

##### *Case Facts*

In August of 2012, Brian Gallagher was riding his motorcycle when he was hit by a pick-up truck whose driver failed to notice a stop sign. As the motorist responsible for the accident, William Stouffer was deemed responsible for Gallagher's bodily injury (BI) and medical (MED) payments. However, the policy Stouffer had purchased from Progressive Casualty Insurance was insufficient to cover the extent of damages sustained by Gallagher.

Gallagher then sought to invoke his underinsured motorist policy from the Government Employee Insurance Corporation. At the time of the accident, both Gallagher's motorcycle and automobile policies were unambiguously in effect, both having been purchased from GEICO. His GEICO motorcycle UIM policy had a maximum value of \$50,000, but his medical needs surpassed the limit.

Each of his automobiles had UIM limits of \$100,000, and Gallagher asserted that he was entitled to the additional \$200,000 of benefits because he was paying an increased premium for stacked coverage on both policies. GEICO paid Gallagher the \$50,000 which he was entitled under his motorcycle policy but denied responsibility for the payments exceeding the limit. Since Gallagher's motorcycle and automobile policies were insured under separate policies, GEICO claimed that the Household Vehicle Exclusion applied and refused further payments.

The language of the Household Vehicle Exclusion is not disputed here; Gallagher's motorcycle and cars were insured under separate policies, so the Exclusion entitled GEICO to withhold payment. The case centered around whether or not this contradicted public policy – specifically the MVFRL – and if Gallagher's reasonable expectations had not been met by his insurer.

Following multiple appeals from both parties, the Supreme Court ultimately ruled in favor of the plaintiff, reversing the Superior Court's decision. We now discuss how *Gallagher* was possible after years of similar cases and explore the Supreme Court's major justifications in making their decisions.

*GEICO V. Ayers: A Plurality Decision*

The case facts of *Gallagher v. GEICO (2019)* very closely parallel those of *GEICO v. Ayers (2008)*. Recall that, in *Ayers*, the courts sided in favor with the insurance company and decided that Ayers was not eligible for stacked payments on his motorcycle following the first accident. The *Ayers* decision, however, was a **plurality decision**; “a majority of the Court’s members agree on the result... [but] there is no majority agreement on the reason for that result.”<sup>32</sup> In the modern legal environment, plurality decisions are non-precedential; the Court’s decision applies only to the one case.

Very few plurality decisions were delivered in the first half of the twentieth century. During this time, the results of pluralities were taken as valid, with the reasoning for reaching such a conclusion being much less relevant. As the number of clouded majority opinions increased, however, the courts took definitive action to handle procedure. In *Marks v. United States (1976)*, the Supreme Court declared that “[w]hen a fragmented Court decides a case and no single rationale explaining results enjoys the assent of five Justices, ‘the holding of the Court may be viewed as that position taken by those Members who concurred in the judgments on the narrowest of grounds...’”<sup>33</sup> Simply put, when a majority of Judges agree on the outcome of a case, but cannot uniformly deliver an opinion as to why the outcome is justified, the decision is limited to that case, only. Subsequent juries and courts may refer to a plurality decision in deciding their currently-considered case, but it cannot be used as a blanket model for how to handle similarly presenting cases.

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<sup>32</sup> Thurmon, Mark Alan. “When the Court Divides: Reconsidering the Precedential Value of Supreme Court Plurality Decisions.” *Duke Law Journal*, vol. 42, no. 2, Nov. 1992, doi:10.2307/1372807.

<sup>33</sup> *Marks v. United States*, 75 A.2d, (1977).

The *Ayers* court's inability to write a unified opinion classified the case as a plurality and is what ultimately allowed Gallagher to file his case against GEICO eleven years later. Gallagher virtually argued that *Ayers* had been wrongly decided. While certain case facts differ – Gallagher, for instance, was only involved in one accident – the similarities between *Ayers* and *Gallagher* are strong enough that the latter would have been almost immediately settled if the former succeeded in setting a precedent.



### *Doctrine of Reasonable Expectations*

Recall Keeton's Doctrine of Reasonable Expectations as introduced in Chapter 1<sup>34</sup> of this paper. This directly relates to the decision in *Gallagher v. GEICO*. Gallagher was paying a premium for stacked insurance on his motorcycle; as such, he expected to receive supplementary payouts from his two stacked automobiles in the event of a severe motorcycle accident. However, GEICO asserted that this was not the case.

The courts further considered the decision from *Rupert v. Liberty Mutual Insurance Company (2002)*, which affirmed that Pennsylvania-insured drivers are entitled to stacked insurance on their vehicles unless they willingly choose to waive that right. Gallagher never chose to sign a waiver, nor was he receiving a reduced premium that would indicate he had opted out of the coverage. The Doctrine of Reasonable Expectations avers that Gallagher had significant reason to believe he would be covered under the inter-stacking policy, even though "painstaking study of the policy provisions would have negated those expectations"<sup>35</sup>. Gallagher was paying a premium for coverage, which, according to GEICO, did not exist. This is fundamentally contradictory and blatantly defies the Doctrine.

Although not the intended subject of the Doctrine, it could be argued that GEICO was not fully realizing the "reasonable" portion of their "reasonable expectations." Pennsylvania law dictates that stacked insurance *must* be included as the default and is only excluded from a policy when an insured knowingly waives their right to this coverage. GEICO was therefore required to offer Gallagher a stacked policy on his motorcycle. It has already been ascertained that GEICO

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<sup>34</sup> Chapter 1; *Contracts of Adhesion & Court Indemnification*

<sup>35</sup> Seno, David J. "The Doctrine of Reasonable Expectations in Insurance Law: What to Expect in Wisconsin." *Marquette Law Review*, vol. 85, no. 3, 2002.

was collecting this stacked premium from Gallagher; since there was only one bike on the policy, however, GEICO assumed that this was nonsensical, a premium collected for essentially no reason. However, just as Gallagher had reasonable expectations that GEICO would provide stacked coverage if he paid a premium, the courts argued that GEICO should have understood their obligation to pay benefits for which they were provided said premium.

## Chapter 4

### Actuarial Considerations and Rate Changes

Policy language should, ideally, be void of any ambiguity. In Chapter 1, we established the tendency of courts to thoroughly indemnify the insured. This trend continued throughout nearly all of the cases in Chapter 2 - with the exception being *Marroquin v. Nationwide* - and is ultimately what turned *Gallagher v. GEICO* in favor of the plaintiff.

Insurers must take proactive measures to address the implications and ramifications of the *Gallagher* decision; this should begin with the adoption of ISO phrasing to minimize policy obscurities. I further propose that insurance companies allocate resources towards dismantling systems barriers that prevent accurate pricing of inter-policy stacked premiums. Once this has been addressed, actuaries should use the methods outlined in this chapter to recalculate premiums to account for the *Gallagher* decision.

#### *Adopt ISO*

The Insurance Services Office (“ISO”), a subsidiary of Verisk Analytics, is an incredibly useful tool to insurers. In fact, ISO exists to “provide advisory services and information to many insurance companies.” Although some companies are quite sizeable, serving millions at a time, insurers are plagued by a common statistical problem: their sample size is still incredibly limited. ISO pools together resources across insurers, getting the most population-mimicking, census-like data possible. ISO’s unique ability to access such diverse, “complete” data gives them an edge, an authority, on statistical insurance and related forecasting; they are “the world’s largest

collection of [insurance premium and loss data].”<sup>36</sup> Their language is clear and founded in strong statistical analysis.

Of course, using ISO language is not free; since it is copyrighted material, insurers must pay a fee to gain the right to include it within their policies. This fee, however, is a *fixed* cost; the insurer is aware of the cost ahead of time, agrees to pay it, and knows with absolute certainty how the “loss” will develop (i.e., for how much they will be liable to pay). Conversely, lawsuits are low-frequency, high-severity, variable costs. Using their own historical data, actuaries may be able to predict a range of losses in the next year. However statistically sound this estimate, though, it is still just an estimate, and the high volatility of these litigations means that the company could be liable for millions more than is anticipated.

“ISO develops and publishes policy language that many insurance companies use as the basis for their product”<sup>37</sup>, language that serves as an industry baseline for clarity. Adopting their vernacular, therefore, could vastly reduce the number of lawsuits. Consequently, actuaries will be able to predict legal costs with a higher degree of certainty and more confidently assess what the company needs to charge for premiums to break-even or profit. The investments into ISO-copyrighted material, then, is probabilistically and financially sound.

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<sup>36</sup> Verisk Analytics. “ISO.” *ISO*, Verisk Analytics, <https://www.verisk.com/insurance/brands/iso/>.

<sup>37</sup> Verisk Analytics. “ISO.” *ISO*, Verisk Analytics, <https://www.verisk.com/insurance/brands/iso/>.

### ***Breaking Informational Systems Barriers***

It is foolish to think that the appropriate adjustments can be made overnight; it is much more rational to budget several months for everything to be put into effect. One of the roadblocks to adequately reflecting the liability changes are the informational systems in place within a company. In *Gallagher v. GEICO*, Gallagher contended that he was entitled to inter-policy stacking in part because GEICO unilaterally decided to put his motorcycle and cars on two separate policies. As such, Gallagher reasoned that GEICO was fully aware of all three vehicles at the time of the accident and should have been aware that they were liable for providing stacked coverage to all.

Suppose, however, that GEICO's IT (informational technology) systems did not allow actuaries and underwriters to see vehicles covered under different parts of the company. Since motorcycles and cars are considered entirely separate, they are insured and treated as such; in fact, separate teams within the actuarial department are designed to work with each group of motor vehicles and do so almost exclusively. Perhaps, then, the computers do not allow for inter-departmental policy verification (i.e., although Gallagher had a motorcycle and two cars with GEICO, neither the motorcycle team nor the private passenger automobile team could use the systems in place to verify the existence of vehicles on the other team).

Addressing such a technological roadblock is a fiscally front-heavy, but incredibly worthwhile, investment. The insurance company will have to delegate a significant portion of their IT department towards creating and implementing a system change that allows underwriters to break down the metaphorical wall separating vehicle types. Of course, full disclosure of information to underwriters is necessary for better determination of appropriate premiums.

In the succeeding paragraphs, we will assume that the systems' problems have been addressed such that underwriters are able to pull insured information across policies. Actuaries must develop a formula to model the indemnification tendencies of courts in the context of the recent *Gallagher v. GEICO* decision.

### *Modeling Insurer Liability*

As discussed in Chapter 1, there is a lengthy history of juries and courts siding with insureds. It is significantly more probable, then, that a legal dispute between insurer and insured will result in the former's loss. We further realize that this indemnification and monetary compensation now precedentially extends to inter-policy stacking, all but solidifying the outcome of the presently-considered lawsuits, should one arise.<sup>38</sup>

In addition to adopting ISO policy language, the insurer should proportionally increase stacked premiums. It is my recommendation that, in calculating the newly-expected liabilities, the insurer does not initially account for the impact of ISO; rather, this affect should be applied to the expected loss towards the end in the form of standard error. This will be illustrated later in this section; before this principle can be numerically investigated, however, it must be probabilistically defined and motivated.

First, let us outline the assumptions crucial to what follows bellow. Let us assume that the per-vehicle, non-stacked premiums have been accurately calculated and assigned in the past<sup>39</sup>; this will become important when we pool company-wide data for analysis. Let us further use  $A$  to denote the event an insured is involved in a NAF accident. Define  $B$  as the event that a claim

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<sup>38</sup> Note that the first recommendation made in this Chapter involves addressing policy language by adopting ISO's syntax. Ideally – and more than likely – this will lower the frequency at which lawsuits occur, since the wording will be standardized and clear, and insureds cannot claim that their Reasonable Expectations or right to waive stacked insurance is violated. This section deals with the scenario in which a case does go to trial and incorporates this reduced probability of lawsuit into the proposed model.

<sup>39</sup> This could mean breaking even or reaching a certain level of profit, depending on the company's objectives.

surpasses an individual's policy limit - given that he or she is subject to a NAF accident – and  $C$  as having two or more vehicles insured under a stacking policy.<sup>40</sup>

For the accident to be truly NAF, the insured's own risk characteristics cannot influence the probability the relevant accident occurs, nor the extent of their injuries; consequently, we claim that  $P(A_n)$  is constant across risk groups. We assume that  $C$  is independent of  $A$  and  $B$ . Further, we are interested in estimating the probability an insurer is liable for stacked insurance claims in a given time period. We further assume that  $P(A_n)$  and  $P(B_n)$  have the ability to change across time.

The probability of interest is then given by:

$$X = P(C \cap (B | A))$$

The assumptions necessary to estimate  $X$  have already been outlined and satisfied.<sup>41</sup> In the next section, R is used to simulate and model the probability an insurer is liable for paying a stacked insurance claim in a given time period. Select code and output is included in the body of this paper, with the complete R script in Appendix C.

We set a seed of 17 so that our results can be reproduced. For  $t = 180$  months, there are  $n = 5,000$  insureds. Although this is not necessarily reasonable in the industry, we assume that these 5,000 insureds are the same from  $t = 1$  to  $t = 180$ .

```
# SET UP INITIAL VARIABLES
set.seed(17) # SET SEED FOR REPRODUCIBILITY
n = 5000 # NUMBER OF INSUREDS AT EACH TIME PERIOD
months = 150 # TIME PERIODS TO OBSERVE
```

<sup>40</sup> If damage surpasses the limit but only one vehicle is insured (i.e., event  $C$  is not satisfied), then the insurer payout will be equivalent to the policy limit; however, it is important to consider  $B$  as an isolated event for the succeeding Bayesian calculations.

<sup>41</sup> These criteria are the assumptions detailed earlier in this section.



Actual insurance data was not available, so demonstrating the proposed procedure is made possible by the simulation of data over time. The chosen initializations may not reflect the true probabilities, but it is necessary to proceed.

The probabilities of NAF accidents and exceeding policy limits given a NAF accident are simulated in accordance with randomly-generated parameters using a **Beta-Binomial Distribution**. (Note: The same procedure is used to model the event a NAF claim surpasses a policy limit; it would be redundant to include the code in the body of this report, but it can be found in Appendix C.) Recall that a Beta-Binomial Distribution is most applicable when we have a fixed number of **Bernoulli** trials ( $n$ ) and an unknown probability of success ( $p$ ).

In this case,  $n = 5,000$  insureds at each time  $t$ , with an unknown probability  $p$  an insured gets into a NAF accident. Note that each  $t$  has a different  $p$ ; that is, we have 180 separate Beta-Binomial Distributions, each with  $n = 5,000$  and an unknown  $p_t$ .  $p_t$  is sampled from a **Beta Distribution** and then used in a **Binomial Distribution** with parameters  $n = 5,000$  and  $p = p_t$ . This procedure is shown for NAF accidents immediately below:

```
# PROBABILITIES THE INSURED IS INVOLVED IN A NAF ACCIDENT
NAF_accident = matrix(rbeta(n = months, shape1 = 1, shape2 = 50))
```

Of course, this step would be altered in industry. Instead of randomly assigning a probability for modeling, actuaries can take advantage of their access to historical data and perform Kruskal-Wallis Tests at each time point. The identified parameters could then be modeled and predicted using similar procedure to what is illustrated.

We now move to modeling the probability an insured holds stacked insurance. Someone who holds stacked insurance in time =  $t$  is more likely than not to have these benefits at time =  $t$

+ 1, and vice versa. These probabilities are easily and directly modeled using a Markov Chain with the following Transition Probability Matrix:

##	No Stacking	Stacking
## No Stacking	0.80	0.20
## Stacking	0.05	0.95

Based on this theoretical data (i.e., for the sakes of our example), the probability of going from State 0 = Not Having Stacked Insurance to State 1 = Having Stacked Insurance = 20%, etc. Limiting probabilities were also calculated to demonstrate the proportion of time insureds will spend in each state:

##	State 0	State 1
## [1, ]	0.2	0.8

We now rely on the properties of conditional probability wherein independent events can be modeled by multiplying their probabilities and  $P(A) = P(B|A)P(B)$ . We model  $A$ , the event an insured is involved in a NAF accident at time =  $t$ , using a binomial distribution with probability  $NAF\_accident$  (at that given time point) and similarly determine  $B$ . These probabilities were used to model which insureds were “successes” (that is, satisfying the given criteria) at every given time period for  $A$  and  $B$ . Since an insured’s risk profile may change month-to-month, this is a reasonable method of modeling.  $C$ , however, was modeled slightly differently.

We initialize  $C$  by randomly-selecting  $nP0$  insureds to hold stacked insurance and the other  $nP1$  to reject. For simplicity, we assume that an insured’s chances of having stacked insurance at time =  $t + 1$  is dependent only upon their state (0 = not having stacked insurance; 1 = having stacked insurance) at time =  $t$ . This allows us to implement a Markov Chain to determine whether or not an individual has stacked insurance. In a typical automobile or motorcycle policy (the focus of this paper), an insured may either renew or adjust their policy to

include or reject stacked coverage. These policy changes typically occur at six month intervals.

To account for this, an individual's state remains constant for six consecutive time periods. The Transition Probability Matrix is then used to determine if and how someone's policy may change to include or reject stacked insurance. Consider the event stacked insurance is included as "success" and assume that decisions are independent of each other (that is, Person X's choice has no impact on Person Y's). The assumptions for a Bernoulli Distribution with parameters of either  $p = P01$  or  $p = P11$  (depending on the state at time =  $t$ ) have been met, and we can consequently assign states for time =  $t + 1$  by using the appropriate Bernoulli Distribution.

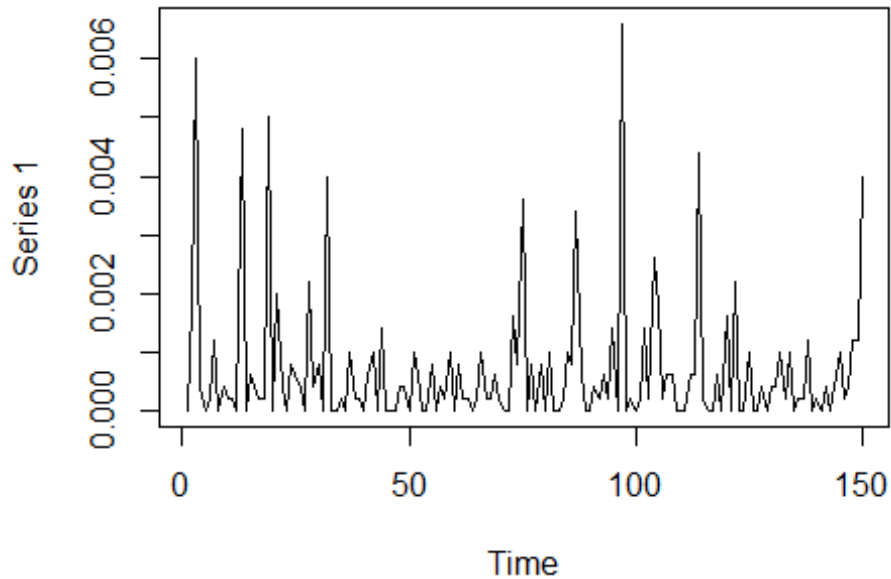
1 is probabilistically assigned if a person satisfies the criterion for *A*, *B*, and/or *C* at each time point; otherwise, a 0 is assigned. An insurer is liable for paying a stacked claim if and only if  $A \times B \times C = 1$  for a given insured at a given time  $t$ . The overall probability an insurer pays a stacked claim at time  $t$  can be found by storing these products in a matrix, summing the columns, and dividing by the number of rows ( $n = 5,000$ ). The result is graphed in Figure 2 below.

The randomness of our data suggests that it would be best modeled using a time series.

We must first perform various transformations to ensure stationarity.

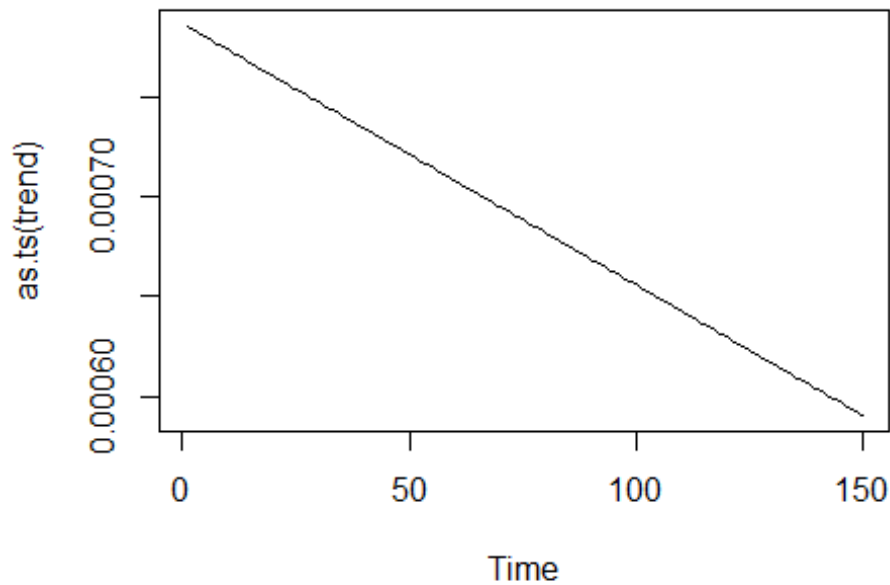
```
probability_insurer_pays_stacked = t(probability_insurer_pays_stacked)
plot(as.ts(probability_insurer_pays_stacked))
```

Figure 2 Probability Insurer Pays Stacked Insurance



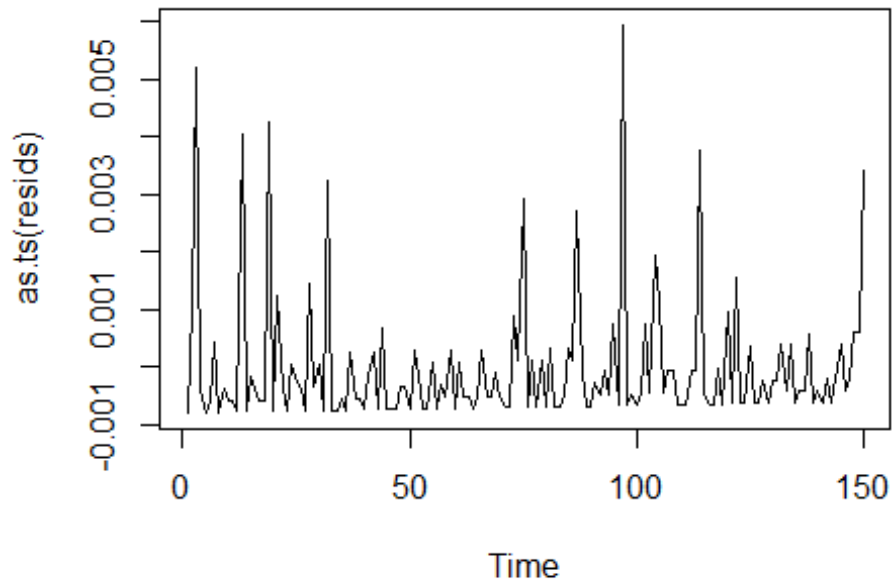
```
trend = lm(probability_insurer_pays_stacked ~ c(1:length(probability_insurer_pays_stacked)))$fitted.values
plot(as.ts(trend), main = 'Trend Component')
```

Figure 3 Trend Component



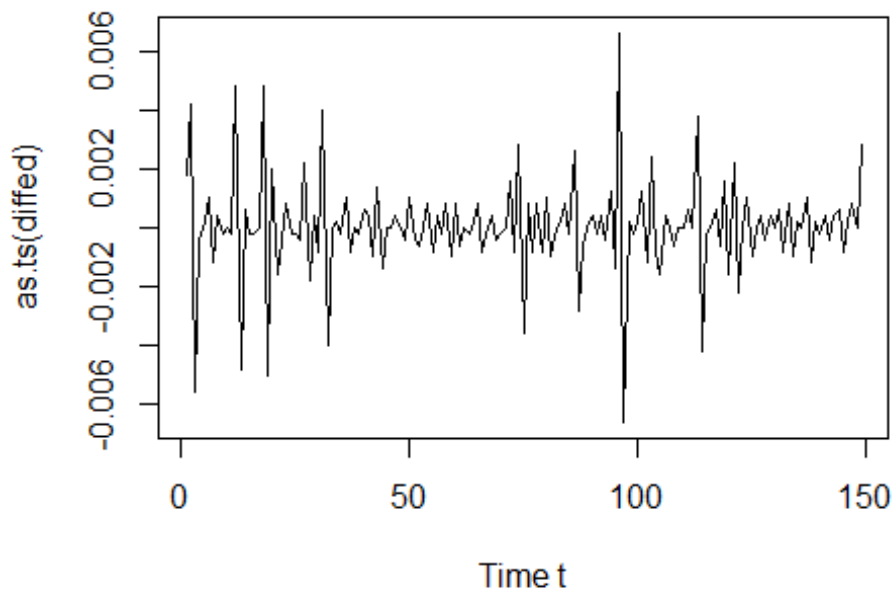
```
resids = lm(probability_insurer_pays_stacked ~ c(1:length(probability_insurer_pays_stacked)))$residuals
plot(as.ts(resids), main = 'Residuals')
```

Figure 4 Residuals



```
diffed = diff(resids)
plot(as.ts(diffed), main = 'Differenced Residuals', xlab = 'Time t')
```

Figure 5 Differenced Residuals

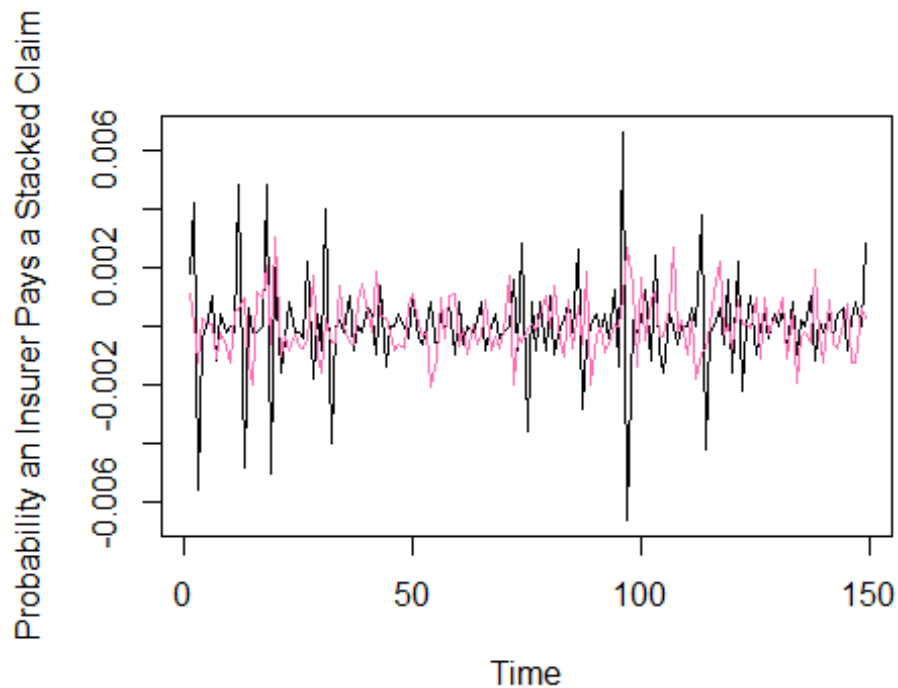


The graph above (Figure 5) shows a series that is much closer to stationarity than that shown in the original graph of probabilities (Figure 2). The assumptions for stationarity were

checked with the exception of independence. Note that we do not explicitly check for independence because our data was generated with a Binomial Distribution (following the generation of probabilities using a Beta Distribution), which, by definition, produces independent observations.

We conclude that the assumptions for stationarity are met and now proceed to fitting the model. Fitting an **ARIMA** model will produce larger values than the probabilities of interest. To account for this discrepancy, we randomly sample  $m$  observations from both the true data and the simulated data, then multiply the entirety of the latter dataset by their quotient. This ensures that the magnitudes are comparable and allows us to check for how well the simulated data matches the observed. A Paired T-Test reveals that the mean of our model is close to the actual data; this is visually confirmed in Figure 6 wherein the superimposed pink line represents the model.

Figure 6 Modeled vs. Actual Probability



Recall that actual data was not available for this study, but that the properties of the underlying variables of interest directly mirror Beta Binomial Distributions. This allowed for the simulation of a plausible dataset which was consequently analyzed. Although the physical numbers resulting from this model's projections may not be accurate, the procedure by which they were found is completely sound. Actuaries can apply the above methods to their own, historically-collected data to produce results applicable to their companies.

## Chapter 5 Conclusions

*Gallagher v. GEICO (2019)* did not happen in a bubble; decades of conflict between insurer and insured has arisen out of contracts of adhesion and, more specifically, out of the Household Vehicle Exclusion. *GEICO v. Ayers (2008)* is a factually, nearly-identical case to *Gallagher*; however, the Supreme Court's inability to codify the reasons for their decision classified *Ayers* as a plurality decision. This allowed Gallagher to contest GEICO's decision to refuse stacked payout following his not-at-fault motorcycle accident. The Supreme Court overturned *Ayers* with *Gallagher*, precedentially concluding that the Household Vehicle Exclusion is violative of the Motor Vehicle Financial Responsibility Law and the Doctrine of Reasonable Expectations.

Class action lawsuits have already begun forming as a result of this recent case. It is necessary that insurers make the appropriate changes to reflect their indubitably increased liability. Firstly, companies should adopt ISO policy language to minimize or eradicate ambiguity, thereby reducing the frequency at which they are sued. The IT department must then work to disable any informational barriers so that an individual's vehicle information is disclosed across departments, regardless of their specific vehicle affiliation. Finally, actuaries must charge the appropriate premiums once they know if an individual has any other insured entities, the procedure of which is detailed in Chapter 4.



## GLOSSARY

<b>ARIMA (Autoregressive Integrated Moving Average)</b>	time series model with parameters for autoregression ( $p$ ), moving average ( $q$ ), and seasonality ( $d$ )
<b>Bernoulli Trial</b>	event having a fixed probability of success $p$
<b>Beta-Binomial Distribution</b>	binomial distribution with the probability of success $p$ being determined by a Beta random variable
<b>Beta Distribution</b>	prior probability distribution for binomial distribution in which values are generated between 0 and 1
<b>Binomial Distribution</b>	$n$ independent Bernoulli trials each with a probability of success $p$
<b>Contract of Adhesion</b>	a standardized, non-contestable contract
<b>Doctrine of Reasonable Expectations</b>	doctrine coined by Robert E. Keeton asserting that the parties in a contract are endowed with certain reasonable expectations of their rights and privileges even though painstaking analysis of the contract may reveal otherwise
<b>Household Vehicle Exclusion</b>	provision in many insurance contracts prohibiting the collection of benefits on a vehicle owned or insured by a resident family member and not insured under the relevant policy
<b>Indemnification</b>	compensation awarded by a court
<b>Insurance Fraud</b>	exaggeration or complete fabrication of an alleged event to receive insurance benefits
<b>Insured</b>	the owner of an insurance contract
<b>Insurer</b>	the company providing the insurance contract
<b>Moral Hazard</b>	incentive for an insured to misrepresent the existence or extent of damages, typically to receive a higher payout from the insurer

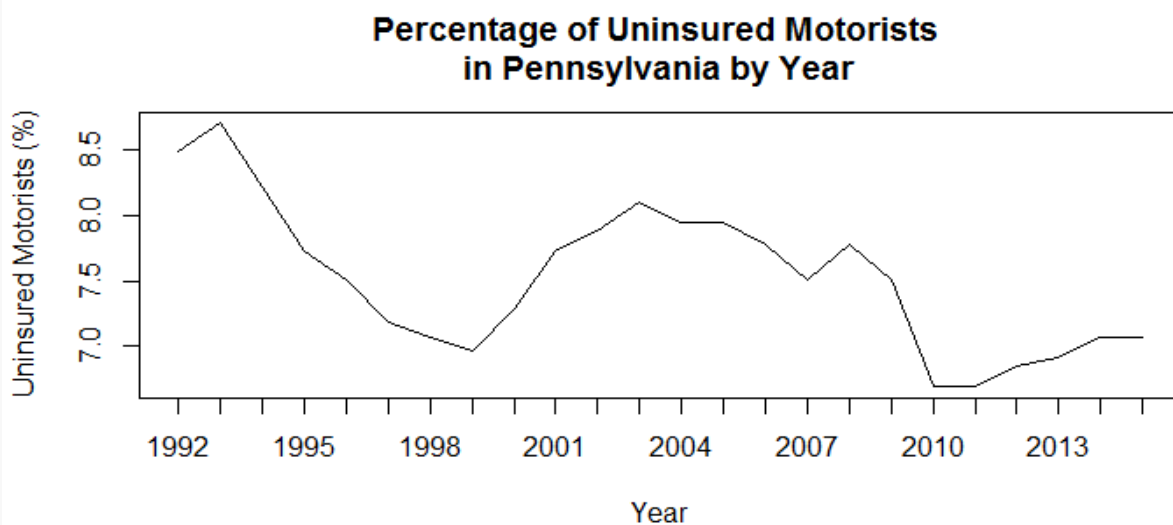
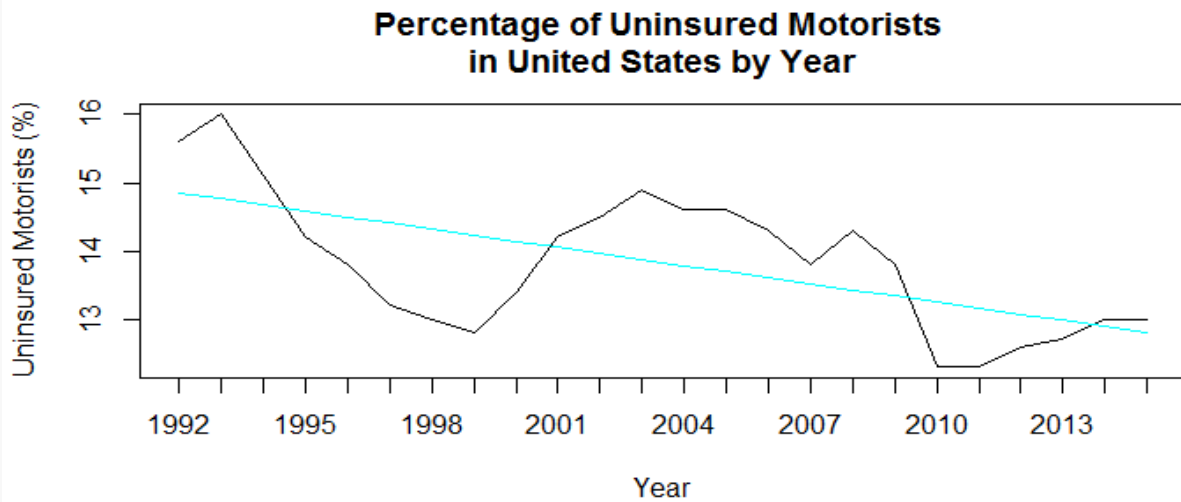
<b>Motor Vehicle Financial Responsibility Law</b>	Pennsylvania statute designed to regulate the insurer-insured dynamic and provide both parties with restrictions and responsibilities
<b>Plurality Decision</b>	non-precedential decision arising when judges reach the same conclusion but fail to unify their reasoning behind the decision
<b>Stacked Insurance</b>	combines coverages on the policies covering the involved and one or more noninvolved vehicles following a not-at-fault accident
<b>Tortfeasor</b>	the party responsible for an accident
<b>Underinsured Motorist</b>	motorist who holds an insurance policy with insufficient coverage to pay for damages following an at-fault accident
<b>Uninsured Motorist</b>	motorist who does not hold an insurance policy

**Appendix A**  
**R Code and Output**

<b>State</b>	<b>pval</b>	<b>conclusion</b>
Alabama	0.977	Fail to Reject Ho
Alaska	0.957	Fail to Reject Ho
Arizona	0.988	Fail to Reject Ho
Arkansas	0.954	Fail to Reject Ho
California	0.992	Fail to Reject Ho
Colorado	0.979	Fail to Reject Ho
Connecticut	0.995	Fail to Reject Ho
D.C.	0.993	Fail to Reject Ho
Delaware	0.988	Fail to Reject Ho
Florida	0.955	Fail to Reject Ho
Georgia	0.966	Fail to Reject Ho
Hawaii	0.977	Fail to Reject Ho
Idaho	0.996	Fail to Reject Ho
Illinois	0.982	Fail to Reject Ho
Indiana	0.979	Fail to Reject Ho
Iowa	0.961	Fail to Reject Ho
Kansas	0.981	Fail to Reject Ho
Kentucky	0.971	Fail to Reject Ho
Louisiana	0.955	Fail to Reject Ho

Maine	0.958	Fail to Reject Ho
Maryland	0.981	Fail to Reject Ho
Massachusetts	0.976	Fail to Reject Ho
Michigan	0.957	Fail to Reject Ho
Minnesota	0.963	Fail to Reject Ho
Mississippi	0.955	Fail to Reject Ho
Missouri	0.951	Fail to Reject Ho
Montana	0.991	Fail to Reject Ho
Nebraska	0.963	Fail to Reject Ho
Nevada	0.977	Fail to Reject Ho
New Hampshire	0.970d	Fail to Reject Ho
New Jersey	0.971	Fail to Reject Ho
New Mexico	0.967	Fail to Reject Ho
New York	0.960	Fail to Reject Ho
North Carolina	0.953	Fail to Reject Ho
North Dakota	0.982	Fail to Reject Ho
Ohio	0.961	Fail to Reject Ho
Oklahoma	0.985	Fail to Reject Ho
Oregon	0.981	Fail to Reject Ho
Pennsylvania	0.962	Fail to Reject Ho
Rhode Island	0.983	Fail to Reject Ho
South Carolina	0.973	Fail to Reject Ho
South Dakota	0.986	Fail to Reject Ho
Tennessee	0.980	Fail to Reject Ho

Texas	1.000	Fail to Reject Ho
Utah	0.985	Fail to Reject Ho
Vermont	0.965	Fail to Reject Ho
Virginia	0.978	Fail to Reject Ho
Washington	0.953	Fail to Reject Ho
West Virginia	0.999	Fail to Reject Ho
Wisconsin	0.986	Fail to Reject Ho
Wyoming	0.963	Fail to Reject Ho



```

# SET UP INITIAL VARIABLES
set.seed(17) # SET SEED FOR REPRODUCIBILITY
n = 5000 # NUMBER OF INSURED AT EACH TIME PERIOD
months = 150 # TIME PERIODS TO OBSERVE
# PROBABILITIES THE INSURED IS INVOLVED IN A NAF ACCIDENT
NAF_accident = matrix(rbeta(n = months, shape1 = 1, shape2 = 50))
# CONDITIONAL PROBABILITIES THE INSURED'S INJURIES SURPASS THEIR LIMIT
# GIVEN THEY'RE INVOLVED IN A NAF ACCIDENT

exceed_limit = matrix(rbeta(n = months, shape1 = 1, shape2 = 20), ncol = months)
colnames(exceed_limit) = c(1:months)

```

```

# STACKED?
# MODEL AS A MARKOV CHAIN
P00 = 0.8
P01 = 0.2
P10 = 0.05
P11 = 0.95
transitions = matrix(c(P00,P10,P01,P11),ncol=2)
colnames(transitions) = c("No Stacking","Stacking")
rownames(transitions) = c("No Stacking","Stacking")

# SYSTEMS OF EQUATIONS FOR FINDING TRANSITION PROBABILITIES
#  $\pi_0 = 0.8\pi_0 + 0.05\pi_1 \rightarrow \pi_0 = 0.05/0.2\pi_1$ 
#  $\pi_1 = 0.2\pi_0 + 0.95\pi_1$ 
#  $\pi_0 + \pi_1 = \pi_2 \rightarrow \pi_0 = 1 - \pi_1$ 
#  $1 - \pi_1 = 0.05/0.2\pi_1$ 
#  $\pi_1 = 1/1.25 = 0.8$ 
#  $\pi_0 = 1 - \pi_1 = 0.2$ 

# In the long-run, 80% of insureds will have stacked insurance
#  $\pi = [0.2 \ 0.8]$ 
pi_0 = 0.2
pi_1 = 0.8
pi = matrix(c(pi_0,pi_1),ncol = 2)
colnames(pi) = c("State 0","State 1")
transitions

##           No Stacking Stacking
## No Stacking      0.80    0.20
## Stacking         0.05    0.95

pi

##           State 0 State 1
## [1,]         0.2    0.8

stacked = matrix(nrow = n, ncol = months)
P0 = sample(1:n,pi_0*n)
for(i in 1:nrow(stacked)){
  if(i %in% P0){
    stacked[i,1] = 0
  }
  else{
    stacked[i,1] = 1
  }
}
for(i in 2:ncol(stacked)){
  if(i%6 != 0){
    stacked[,i] = stacked[,i-1]
  }
}

```





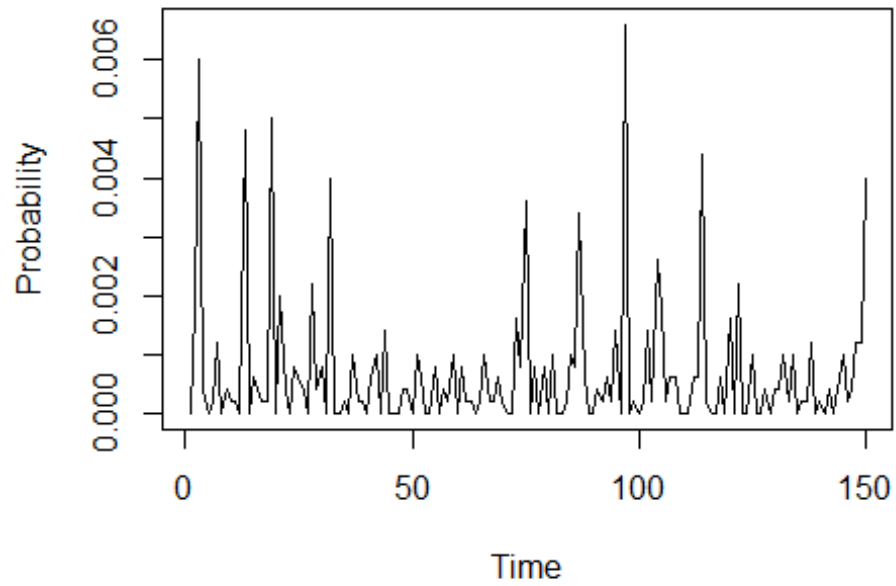
```
pick = sample(1:n,choose)
for(j in 1:nrow(B)){
  if(j %in% pick){
    B[j,i] = 1
  }
  else{
    B[j,i] = 0
  }
}
}

C = stacked

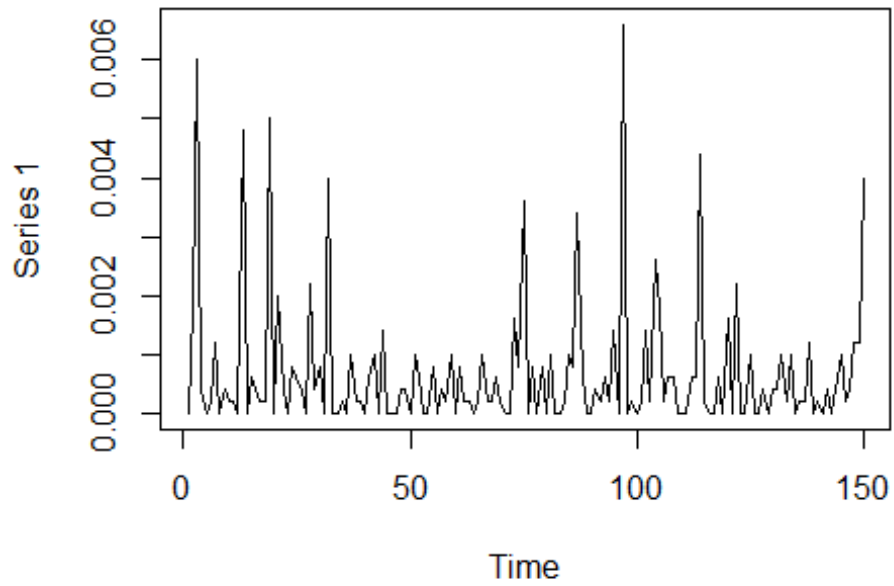
insurer_liable_for_stacked = matrix(nrow = n, ncol = months)
for(i in 1:n){
  for(j in 1:months){
    insurer_liable_for_stacked[i,j] = A[i,j]*B[i,j]*C[i,j]
  }
}

probability_insurer_pays_stacked = matrix(ncol = months)
for(i in 1:months){
  probability_insurer_pays_stacked[i] = sum(insurer_liable_for_stacked[,i])/n
}
plot(as.ts(as.list(probability_insurer_pays_stacked)), main = 'Probability an
Insurer Pays\n a Stacked Insurance Claim', xlab = 'Time', ylab = 'Probability
')
```

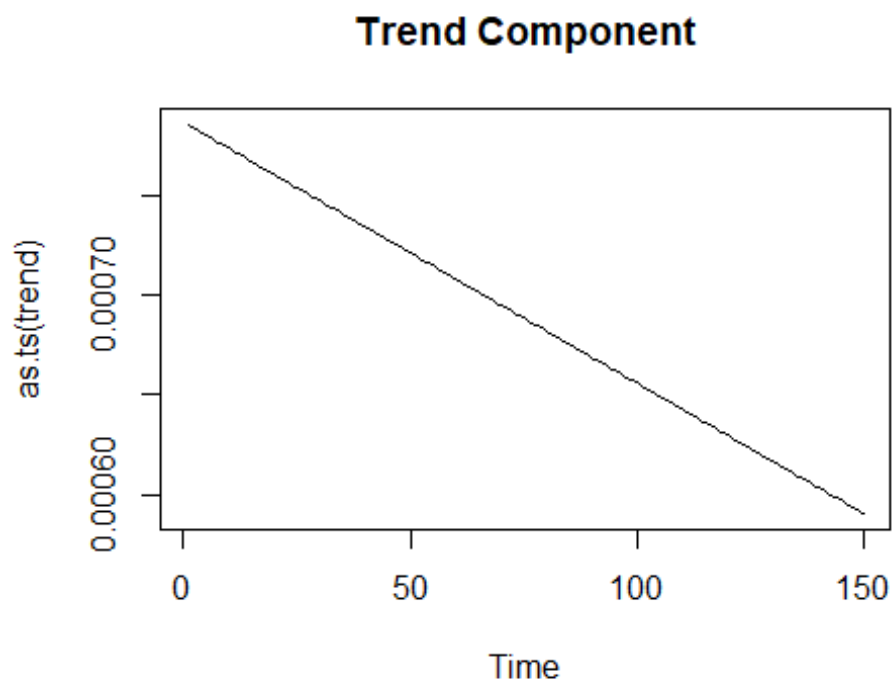
### Probability an Insurer Pays a Stacked Insurance Claim



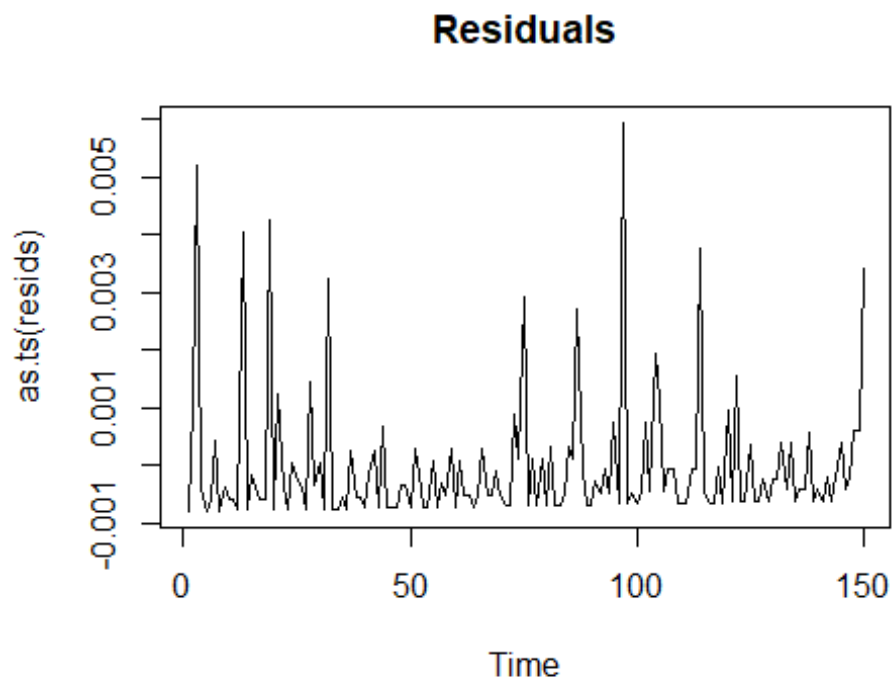
```
probability_insurer_pays_stacked = t(probability_insurer_pays_stacked)
plot(as.ts(probability_insurer_pays_stacked))
```



```
trend = lm(probability_insurer_pays_stacked ~ c(1:length(probability_insurer_pays_stacked)))$fitted.values
plot(as.ts(trend), main = 'Trend Component')
```

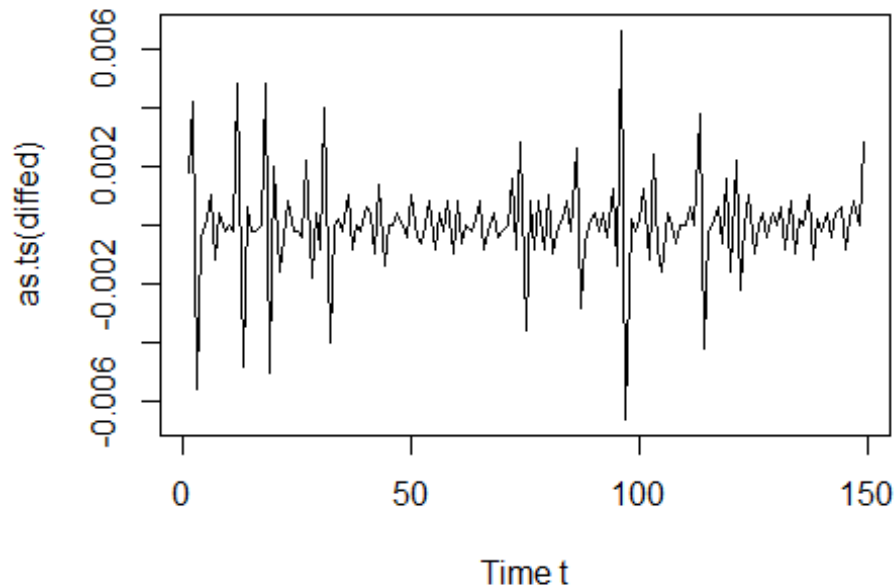


```
resids = lm(probability_insurer_pays_stacked ~ c(1:length(probability_insurer_pays_stacked)))$residuals  
plot(as.ts(resids), main = 'Residuals')
```



```
diffed = diff(resids)
plot(as.ts(diffed), main = 'Differenced Residuals', xlab = 'Time t')
```

### Differenced Residuals



```
# EQUAL VARIANCE?
g1 = diffed[1:floor(length(diffed)/2)]
g2 = diffed[(floor(length(diffed)/2)+1):length(diffed)]
var.test(g1,g2)

##
## F test to compare two variances
##
## data:  g1 and g2
## F = 1.1214, num df = 73, denom df = 74, p-value = 0.6241
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7076192 1.7784865
## sample estimates:
## ratio of variances
##          1.121415

var.test(g1,diffed)

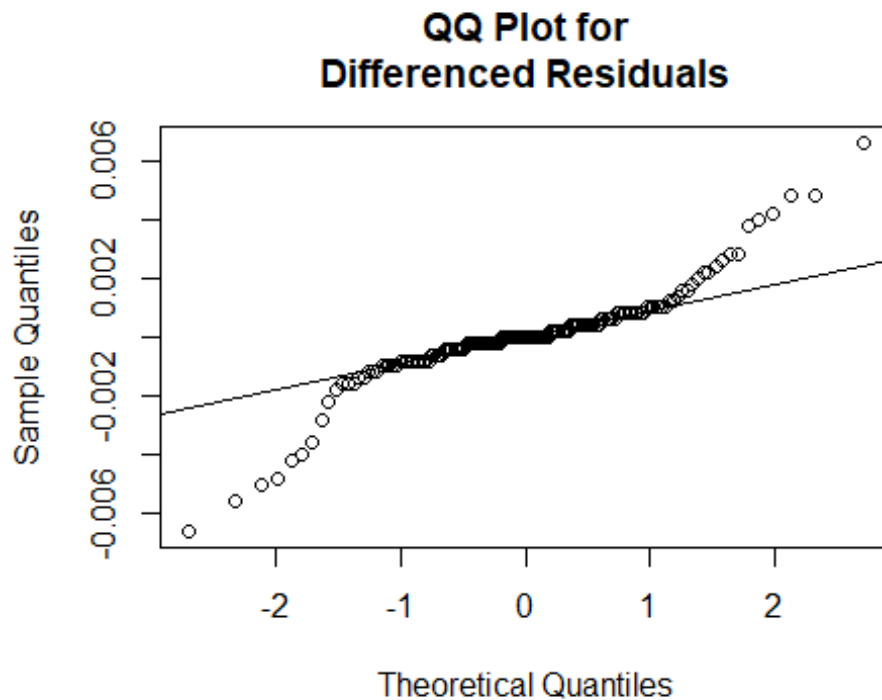
##
## F test to compare two variances
##
## data:  g1 and diffed
## F = 1.0647, num df = 73, denom df = 148, p-value = 0.7391
## alternative hypothesis: true ratio of variances is not equal to 1
```

```
## 95 percent confidence interval:
## 0.7242393 1.6084301
## sample estimates:
## ratio of variances
##          1.064665

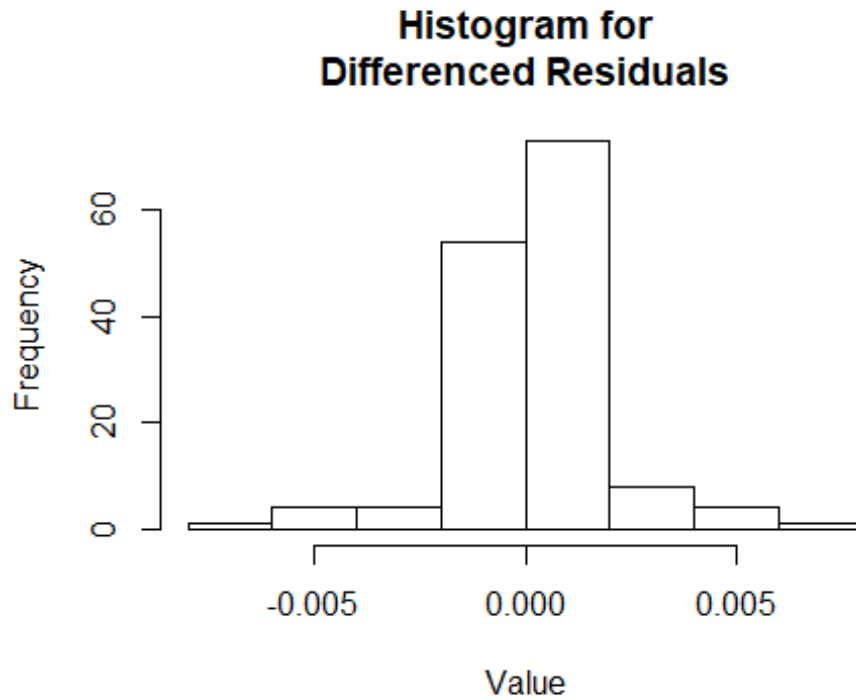
var.test(g2,diffed)

##
## F test to compare two variances
##
## data:  g2 and diffed
## F = 0.94939, num df = 74, denom df = 148, p-value = 0.8149
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.6467785 1.4311282
## sample estimates:
## ratio of variances
##          0.9493943

# EQUAL MEAN?
# ANOVA ASSUMPTION: NORMALITY
qqnorm(diffed, main = 'QQ Plot for\nDifferenced Residuals')
qqline(diffed)
```

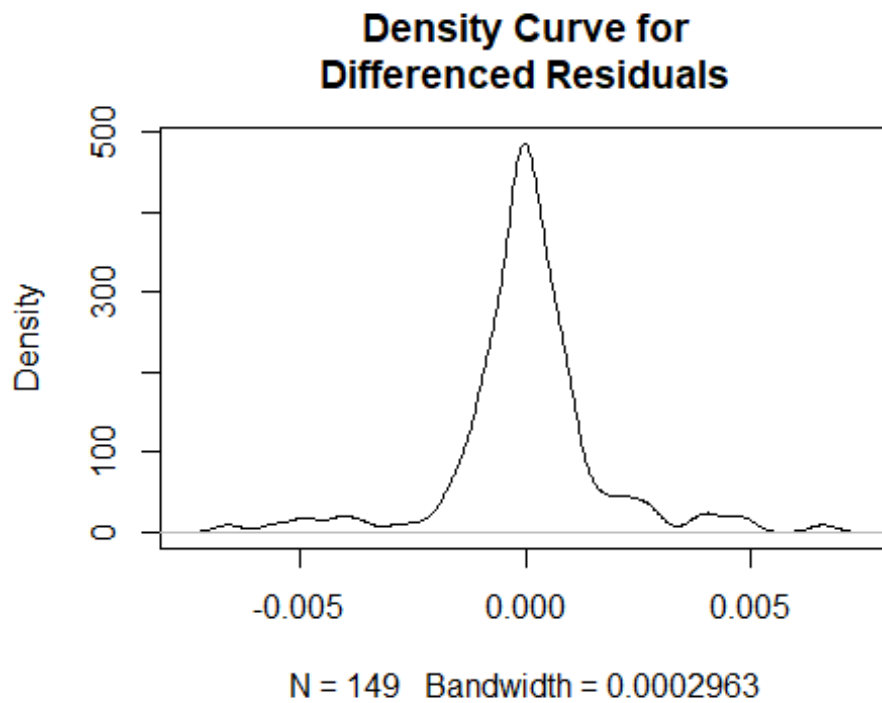


```
hist(diffed, main = 'Histogram for\nDifferenced Residuals', xlab = 'Value  
)
```



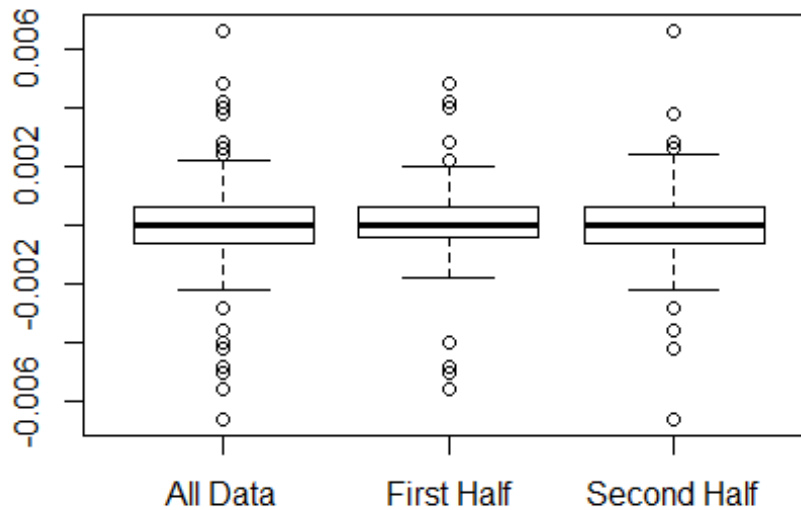
```
plot(density(diffed),main='Density Curve for\nDifferenced Residuals')
```





```
shapiro.test(diffed)
##
## Shapiro-Wilk normality test
##
## data: diffed
## W = 0.86891, p-value = 3.589e-10
  boxplot(diffed,g1,g2,main = 'Boxplots for Analyzing Means\nAcross Differenced Residuals',names = c('All Data','First Half','Second Half'))
```

### Boxplots for Analyzing Means Across Differenced Residuals



```
t.test(g1,g2)
```

```
##
## Welch Two Sample t-test
##
## data: g1 and g2
## t = 0.15518, df = 146.27, p-value = 0.8769
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.0005083443 0.0005949750
## sample estimates:
## mean of x mean of y
## 4.995288e-05 6.637569e-06
```

```
t.test(g1,diffed)
```

```
##
## Welch Two Sample t-test
##
## data: g1 and diffed
## t = 0.088435, df = 141.77, p-value = 0.9297
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.0004655723 0.0005091783
## sample estimates:
```

```

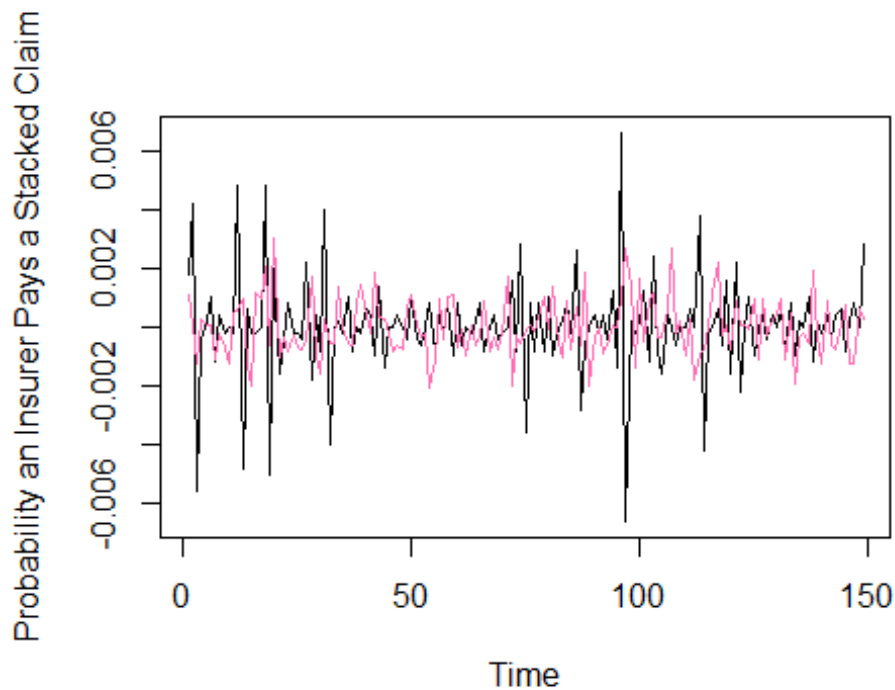
##      mean of x      mean of y
## 4.995288e-05 2.814987e-05

t.test(g2,diffed)

##
## Welch Two Sample t-test
##
## data:  g2 and diffed
## t = -0.091066, df = 151.92, p-value = 0.9276
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.0004882256  0.0004452010
## sample estimates:
##      mean of x      mean of y
## 6.637569e-06 2.814987e-05

model = arima(diffed)
vals = arima.sim(model=model,n=length(diffed))
m = sample(1:length(vals),round(length(vals)/3))
factor = mean(diffed[m]/vals[m])
vals = vals*factor
plot(as.ts(diffed),ylab = 'Probability an Insurer Pays a Stacked Claim')
lines(vals,col='hotpink1')

```



```
t.test(vals,diffed,paired = TRUE)

##
## Paired t-test
##
## data: vals and diffed
## t = -0.17324, df = 148, p-value = 0.8627
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.0003351167 0.0002810958
## sample estimates:
## mean of the differences
## -2.701048e-05
```



## Appendix B

### Relevant Statutes

#### HOUSEHOLD VEHICLE EXCLUSION

This coverage does not apply to bodily injury while occupying or from being struck by a vehicle owned or leased by you or a relative that is not insured for underinsured motorist coverage under this policy.

#### RELEVANT SECTIONS OF THE MOTOR VEHICLE FINANCIAL RESPONSIBILITY LAW, CHAPTER 17

##### §1717. Stacking of benefits.

First party benefits shall not be increased by stacking the limits of coverage of:

- (1) multiple motor vehicles covered under the same policy of insurance; or
- (2) multiple motor vehicle policies covering the individual for the same loss.

(Feb. 12, 1984, P.L.53, No.12, eff. Oct. 1, 1984)

##### §1731. Availability, scope, and amount of coverage.

- (a) Mandatory offering. -- No motor vehicle liability insurance policy shall be delivered or issued for delivery in this Commonwealth, with respect to any motor vehicle registered or principally garaged in this Commonwealth, unless uninsured motorist and underinsured coverages are offered therein or supplemental thereto in amounts as provided in section 1734 (relating to request for lower limits of coverage). Purchase of uninsured motorist and underinsured motorist coverages is optional.
- (b) Uninsured motorist coverage. -- Uninsured motorist coverage shall provide protection for persons who suffer injury arising out of the maintenance or use of a motor vehicle and are legally entitled to recover damages therefor from owners or operators of uninsured motor vehicles. The name insured shall be informed that he may reject uninsured motorist coverage by signing the following written rejection form:

##### REJECTION OF UNINSURED MOTORIST PROTECTION

By signing this waiver I am rejecting uninsured motorist coverage under this policy, for myself and all relatives residing in my household. Uninsured coverage protects me and relatives living in my household for losses and damages suffered if injury is caused

by the negligence of a driver who does not have any insurance to pay for losses and damages. I knowingly and voluntarily reject this coverage.

Signature of First Named Insured

Date

**(b.1) Limitation of rejection.**--Uninsured motorist protection may be rejected for the driver and passengers for rental or lease vehicles which are not otherwise common carriers by motor vehicle, but such coverage may only be rejected if the rental or lease agreement is signed by the person renting or leasing the vehicle and contains the following rejection language:

Rejection of Uninsured Motorist Protection

I am rejecting uninsured motorist coverage under this rental or lease agreement, and any policy of insurance or self-insurance issued under this agreement, for myself and all other passengers of this vehicle. Uninsured coverage protects me and other passengers in this vehicle for losses and damages suffered if injury is caused by the negligence of a driver who does not have any insurance to pay for losses and damages.

**(b.2) Rejection language change.**--The rejection language of subsection (b.1) may only be changed grammatically to reflect a difference in tense in the rental agreement or lease agreement.

**(b.3) Vehicle rental services.**--The requirements of subsection (b.1) may be met in connection with an expedited vehicle rental service, which service by agreement of the renter does not require the renter's signature for each rental, if a master enrollment or rental agreement contains the rejection language of subsection (b.1) and such agreement is signed by the renter.

**(c) Underinsured motorist coverage.**--Underinsured motorist coverage shall provide protection for persons who suffer injury arising out of the maintenance or use of a motor vehicle and are legally entitled to recover damages therefor from owners or operators of underinsured motor vehicles. The named insured shall be informed that he may reject underinsured motorist coverage by signing the following written rejection form:

REJECTION OF UNDERINSURED MOTORIST PROTECTION

By signing this waiver I am rejecting underinsured motorist coverage under this policy, for myself and all relatives residing in my household. Underinsured coverage protects me and relatives living in my household for losses and damages suffered if injury is caused by the negligence of a driver who does not

have enough insurance to pay for all losses and damages. I knowingly and voluntarily reject this coverage.

Signature of First Named Insured

Date

**(c.1) Form of waiver.**--Insurers shall print the rejection forms required by subsections (b) and (c) on separate sheets in prominent type and location. The forms must be signed by the first named insured and dated to be valid. The signatures on the forms may be witnessed by an insurance agent or broker. Any rejection form that does not specifically comply with this section is void. If the insurer fails to produce a valid rejection form, uninsured or underinsured coverage, or both, as the case may be, under that policy shall be equal to the bodily injury liability limits. On policies in which either uninsured or underinsured coverage has been rejected, the policy renewals must contain notice in prominent type that the policy does not provide protection against damages caused by uninsured or underinsured motorists. Any person who executes a waiver under subsection (b) or (c) shall be precluded from claiming liability of any person based upon inadequate information.

**(d) Limitation on recovery.**--

(1) A person who recovers damages under uninsured motorist coverage or coverages cannot recover damages under underinsured motorist coverage or coverages for the same accident.

(2) A person precluded from maintaining an action for noneconomic damages under section 1705 (relating to election of tort options) may not recover from uninsured motorist coverage or underinsured motorist coverage for noneconomic damages.

(Feb. 12, 1984, P.L.53, No.12, eff. Oct. 1, 1984; Feb. 7, 1990, P.L.11, No.6, eff. July 1, 1990; Dec. 28, 1994, P.L.1441, No.170, eff. 60 days; Dec. 28, 1994, P.L.1450, No.172, eff. 60 days; July 6, 1995, P.L.246, No.30, eff. 60 days)

**1995 Amendment.** Act 30 amended subsec. (b.1) and added subsecs. (b.2) and (b.3), retroactive to December 28, 1994, as to subsec. (b.1).

**Cross References.** Section 1731 is referred to in sections 1705, 1734 of this title.

**§1732. Limits of coverage (Repealed).**

**1990 Repeal.** Section 1732 was repealed February 7, 1990, P.L.11, No.6, effective July 1, 1990.

**§1733. Priority of recovery.**



**(a) General rule.**--Where multiple policies apply, payment shall be made in the following order of priority:

(1) A policy covering a motor vehicle occupied by the injured person at the time of the accident.

(2) A policy covering a motor vehicle not involved in the accident with respect to which the injured person is an insured.

**(b) Multiple sources of equal priority.**--The insurer against whom a claim is asserted first under the priorities set forth in subsection (a) shall process and pay the claim as if wholly responsible. The insurer is thereafter entitled to recover contribution pro rata from any other insurer for the benefits paid and the costs of processing the claim.

(Feb. 7, 1990, P.L.11, No.6, eff. July 1, 1990)

**§1734. Request for lower limits of coverage.**

A named insured may request in writing the issuance of coverages under section 1731 (relating to availability, scope and amount of coverage) in amounts equal to or less than the limits of liability for bodily injury.

(Feb. 7, 1990, P.L.11, No.6, eff. July 1, 1990)

**Cross References.** Section 1734 is referred to in section 1731 of this title.

**§1735. Coverages unaffected by workers' compensation benefits (Repealed).**

**1993 Repeal.** Section 1735 was repealed July 2, 1993, P.L.190, No.44, effective immediately.

**§1736. Coverages in excess of required amounts.**

The coverages provided under this subchapter may be offered by insurers in amounts higher than those required by this chapter but may not be greater than the limits of liability specified in the bodily injury liability provisions of the insured's policy.

**§1737. Workers' compensation benefits not a bar to uninsured and underinsured motorist benefits (Repealed).**

**1993 Repeal.** Section 1737 was repealed July 2, 1993, P.L.190, No.44, effective immediately.

**§1738. Stacking of uninsured and underinsured benefits and option to waive.**

**(a) Limit for each vehicle.**--When more than one vehicle is insured under one or more policies providing uninsured or underinsured motorist coverage, the stated limit for uninsured or underinsured coverage shall apply separately to each vehicle so insured. The limits of coverages available under this

subchapter for an insured shall be the sum of the limits for each motor vehicle as to which the injured person is an insured.

**(b) Waiver.**--Notwithstanding the provisions of subsection (a), a named insured may waive coverage providing stacking of uninsured or underinsured coverages in which case the limits of coverage available under the policy for an insured shall be the stated limits for the motor vehicle as to which the injured person is an insured.

**(c) More than one vehicle.**--Each named insured purchasing uninsured or underinsured motorist coverage for more than one vehicle under a policy shall be provided the opportunity to waive the stacked limits of coverage and instead purchase coverage as described in subsection (b). The premiums for an insured who exercises such waiver shall be reduced to reflect the different cost of such coverage.

**(d) Forms.**--

(1) The named insured shall be informed that he may exercise the waiver of the stacked limits of uninsured motorist coverage by signing the following written rejection form:

UNINSURED COVERAGE LIMITS

By signing this waiver, I am rejecting stacked limits of uninsured motorist coverage under the policy for myself and members of my household under which the limits of coverage available would be the sum of limits for each motor vehicle insured under the policy. Instead, the limits of coverage that I am purchasing shall be reduced to the limits stated in the policy. I knowingly and voluntarily reject the stacked limits of coverage. I understand that my premiums will be reduced if I reject this coverage.

Signature of First Named Insured

Date

(2) The named insured shall be informed that he may exercise the waiver of the stacked limits of underinsured motorist coverage by signing the following written rejection form:

UNDERINSURED COVERAGE LIMITS

By signing this waiver, I am rejecting stacked limits of underinsured motorist coverage under the policy for myself and members of my household under which the limits of coverage available would be the sum of limits for each motor vehicle insured under the policy. Instead, the limits of coverage that I am purchasing shall be reduced to the limits stated in the policy. I knowingly and voluntarily reject the stacked limits of

coverage. I understand that my premiums will be reduced if I reject this coverage.

Signature of First Named Insured

Date

**(e) Signature and date.**--The forms described in subsection (d) must be signed by the first named insured and dated to be valid. Any rejection form that does not comply with this section is void.

(Feb. 7, 1990, P.L.11, No.6, eff. July 1, 1990)

**1990 Amendment.** Act 6 added section 1738.

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# ACADEMIC VITA

## Juliette Isabelle van Schaik

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### EDUCATION

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*The Pennsylvania State University: Schreyer Honors College*  
*University Park, PA*

Graduation: December 2019

- Major: Statistics – Applied
- Minor: Business
- Area of Honors: Risk Management
- Education Abroad: Business in the European Union

#### *Actuarial Exams and VEEs*

- P (Probability) Exam Passed: 2018
- FM (Financial Mathematics) Exam Passed: 2018
- IFM (Investment and Financial Markets) Exam Passed: 2019
- VEE Economics Qualified: 2018
- VEE Accounting and Corporate Finance Qualified: 2018
- VEE Mathematical Statistics Qualified: 2019

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### ACCOLADES

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#### *Distinctions*

- World Record (Unofficial): Female Pi Recitation Achieved: 2014
- MENSA Inducted: 2015
- Phi Sigma Pi National Honors Fraternity (Scholarship, Recruitment Chairs) Inducted : 2017

#### *Scholarships*

- Eberly College of Science Scholarship
- Excellence Scholarship
- Provost Award
- Matthew Rosenshine Excellence in Statistics Award
- NASA WISER Grant

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### EMPLOYMENT

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*Actuarial Assistant*

January 2020 –

*GEICO*

*Chevy Chase, MD*

- Develop and present proposals to senior management
- Perform rate reviews for the commercial team
- Attend department-wide product decision meetings

*Actuarial Intern*

Summer 2019

*GEICO*

*Chevy Chase, MD*

- Created pure premium model for large commercial policies (>\$500,000 limits) using R
- Built interactive average premium monitor in Excel to compare commercial and private passenger data by state, coverage, and vehicle type
- Conducted a rate review for the Alabama commercial product and filed with the state

*Teacher's Assistant: Risk Management*

2018 – Present

*Pennsylvania State University Department of Risk Management*

*State College, PA*

- Grade exams concerning the fundamental principles of risk management and insurance
- Assist students with course material via Canvas