



# WPI

## **Kidnapping and Ransom Insurance Product Development**

Major Qualifying Project Report submitted to the Faculty of the Worcester Polytechnic Institute in partial fulfillment for the Degree of Bachelor of Science in Actuarial Mathematics

May 29, 2015

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## **Abstract**

This project examines and develops a company's process for developing Kidnapping and Ransom Insurance while developing a premium that would be beneficial to customers while allowing our company to be profitable. To do this we gathered data that would help us develop a model, which calculates a company's premium based on the information they give us. We then simulated the first ten years of our business 1000 times and tested different company growth plans, premium loadings, and policy limits to assure that our company would be profitable. We concluded that our product would be successful and profitable within the first ten years.

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## **Executive Summary**

The goal of our project was to examine a hypothetical insurance company's pricing process for Kidnapping and Ransom insurance (KNR) and develop a premium that would be charged to customers and be profitable to our company. To meet this goal, our objectives were to:

1. Create our product
2. Research and gather data
3. Develop a model to calculate a premium
4. Simulate the model
5. Analyze our results

We created our product by doing research on KNR policies that other insurers provide. By doing this, we were able to compare different policies and see what is essential to cover and how we can differentiate our product from others that are already on the market. In order to properly price our product, we researched every cost that would be associated with kidnappings, and the likelihood of an individual, or group of individuals, being kidnapped in each country. We gathered data concerning kidnapping rates across various countries and industries, average ransom sizes, and other expenses that might occur within a claim.

We gathered our data from a multitude of reliable resources, mainly including government and statistical reports. These sources were especially helpful for data on kidnapping odds and average ransom demands. Other data, such as average employees' salary in certain industries, were also collected from these sources. However, as not every country reports this

type of data, we were not able to find kidnapping data on every country. In order to compensate, we got a more general feel for how risky a country was based on articles from media sites, and then decided if the country was worth covering.

After gathering all of this data, we designed a model that would calculate the premium for a company after retrieving that company's information. The model took into account seven key factors:

- 1.) Expected ransom demands for a country
- 2.) Expected value of employee's salary up to 30 days
- 3.) Expected medical costs and crisis response team expenses
- 4.) Odds of being kidnapped, depending on destination, industry type, and size of travel group
- 5.) The number of employees in a trip
- 6.) Expected yearly travel frequency and length of stay
- 7.) Premium loading

Due to the limited availability of information, we had to use placeholders for some of the data. Nevertheless, these were educated guesses backed by our research.

We then simulated the first 10 years of our business 1000 times. In the process of experimenting with our numbers, we planned out the company growth plan. This plan consisted of the startup costs including the office environment and equipment, what positions we would hire for, when we would hire more employees to deal with the increasing workload and how

many more we would hire, and how much we expected our clientele to grow each year. We then decided on our marketing strategy and how we would determine our premium loading.

After running our simulations, we determined that there was a very good chance that our product would, in fact, be profitable within the first 10 years. We also determined that using a 20% premium loading would be the most advantageous for both our company and our clients. Also since the policy limit didn't change the results too drastically, we decided to allow clients to choose whichever policy limit they desired.

## Chapter 1: Introduction

Insurance is a product in which most people in the United States own. The purpose of insurance is to protect against the unknown. The future is uncertain and presents the possibilities of many different risks such as that of death, accidents, fraud, and robbery. There are a wide variety of different types of protection a person can buy ranging from life insurance to auto insurance to insurance of personal property. There are also different types of insurance that can be purchased based on a consumer's needs. An example of this would be someone buying insurance for a boat they just purchased or travel insurance for a vacation they are about to go on. Insurance is something that will always be in demand. It is the company's responsibilities to try and predict the amount of losses for the year and provide competitive prices that would cover the cost of these losses. This project is aimed to gain a better understanding of how those in the actuarial field price a profitable insurance product. More specifically, how they would develop a Kidnap & Ransom insurance product.

A person may face different types of risks depending on what is happening in the country and government at a given point in time. It may also depend on a person's lifestyle and things they do every day that may present a threat to one's well-being. An instance of a threat would be kidnapping. Many people think of kidnapping as something that is very rare and not something that could possibly happen to them. The reality is that it is a huge risk, which can happen to anyone including people of any class range. As with any type of insurance, there are people who are more at risk than others but no one is completely safe from being kidnapped. With terrorism, drug wars, and the corruption of some countries the rate of kidnapping and ransoms has been quickly rising.



With the risk of kidnapping growing dramatically over the past decade and insurance companies always looking for a way to get ahead of the competition by supplying people with specialized products, KNR is something that has been growing in the insurance market. This is a type of insurance that is targeted towards large businesses whose employees travel frequently to foreign countries. KNR is not something which is well known, but it is something which a lot of businesses own. Businesses would benefit most from this product because they are most at risk, because they are responsible for the safety of hundreds of employees. Wealthy individuals and families are also consumers who may find value in our product, but we do not plan on targeting that audience.

Our project team's goal was to examine an insurance company's pricing process for Kidnapping and Ransom insurance and develop a premium that would be charged to customers and be both profitable to our company and competitive in the market. In order to develop a product that can be sold in the insurance market, the premium must be established. The price of our product must be able to compete with other insurance companies in the market. The price must also cover the expected value of our yearly losses and the cost it takes to run a business while also making sure that our company can recover if there exists a year with a high amount of losses. In order to achieve a successful premium, our team researched many different factors that could influence the chance a person has of being kidnapped and held for ransom.

## Chapter 2: Background

In this chapter, we discuss background information regarding the challenges and benefits of KNR. First, we discuss the characteristics of KNR; explain why KNR is important, and how to develop an insurance product.

### 2.1 Overview of Actuarial Mathematics

Throughout this project, forms of actuarial math such as probability theory and interest theory were used. A very important and useful idea from probability theory is the expected value. An expected value is the mean and its formula is as follows:

$$E[X] = \sum_{k=1}^n x_k p_k$$

In this equation, the expected value of a discrete random variable  $X$  is being calculated and  $p_k$  is the probability of  $X$  occurring. In insurance, actuaries find the expected values of claims in order to price a premium.

An aspect that we used in our model involved interest theory in time value of money. This is used to be able to move the value of money around a timeline. In our project, we would most likely be using it to discount the value of money to the present value. The formula to do this is as follows:

$$\ddot{a}_{\overline{n}|i} = \frac{1 - v^n}{i}$$

In this equation  $v$  is the discounting factor, which is defined as  $\frac{1}{1+i}$ , where  $i$  is the effective interest rate. The “ $n$ ” in the equation is the number of periods of time, such as years, months, days, etc.

## **2.2 Overview of Kidnap and Ransom**

KNR is mostly targeted towards big companies, but there are also products for schools, churches, and nonprofits. In addition, there are policies that are marketed to very wealthy families and people who have positions in power. KNR is a growing market. According to The Economist, the past few years have been good for providers of KNR due to Somali pirates, a large amount of abductions for profit or politics, and high-profile cases that received media coverage (The Economist, 2013). “According to Greg Bangs, a ransom product manager at the Chubb Group, up to 80% of the Fortune 500 companies had purchased K&R policies for their globetrotting executives by December 2003” (Wong, 2004). Even though the market is growing, there aren’t too many insurance companies that provide this type of insurance.

KNR can be inexpensive compared to what one might think it would cost. Corporate policies range between \$1,500 and \$5,000 a year for \$1 million of coverage and sometimes coverage can be arranged up to \$5 million under certain circumstances (Lobo-Guerrero, 2007). According to Merklings, a financial consultant, the average annual premium for a large multinational corporation is about \$25,000 to \$50,000 (Merklings, 43). She also makes the case for more extensive plans that can range between an “annual premium of \$10,000 to more than \$150,000 per person, depending on option, location and frequency of travel”(Merklings, 43) and gives the example of Boris Becker, a professional tennis player, who carried a \$10 million dollar policy with a \$160,000 annual premium (Merklings, 43). According to Merklings, sometimes discounts are available for companies who train their employees in kidnap prevention techniques. (Merklings, 43).

From existing insurers' websites, we were able to compile what most KNR policies cover. These policies usually consider the insured to be officers, directors, employees, guest relatives, and any person handling ransom money. In addition to reimbursement of a paid ransom, a policy typically covers extortion, wrongful or illegal detention, hijacking, medical expenses, loss due to injury, time away from work after release, travel expenses, the cost of hiring and training new or temporary employees, a reward paid to informants leading to the arrest and convictions of responsible parties. Most providers also typically provide a crisis response team and professional advice when an event occurs.

Different companies break down how they sell this insurance in different ways. Popular providers include Travelers, AIG, Aon, Hiscox, and Chubb. Travelers and AIG sell it with other types of insurance as a corporate package. Aon offers three types of insurance policies: corporate protection, family protection, and marine piracy policy. Hiscox and Chubb both offer multiple types of policies for privately owned businesses, nonprofits, schools, and churches.

### **2.3 Importance of Kidnapping and Ransom Insurance**

Each year it is estimated that between 8,000 and 25,000 kidnappings occur globally. It is very hard for an estimate of exact numbers because only around 10% of kidnapping are reported while the rest are kept quiet in fear of repercussions from kidnappers (Zuccarello, 2011). Despite the lack of kidnapping reports, there is no doubt that the kidnapping industry has been on the rise. Not including all of the unreported incidents, the United States State Department website reports 'alarming increases' in kidnapping. This website tracks crime trends globally. It also states that kidnapping "continued to increase dramatically nationwide" (Wallis, 2012). In

addition, other governments are reporting increases in kidnappings. Between 2005 and 2011 Mexico reported more than a 200% increase in crime (Wallis, 2012).

Besides the quantity of kidnappings increasing, the amount of ransom money is also increasing and has risen by 15% each year (Kidnapping and ransom, 1997). The amount of people who face danger has also escalated. The United States Commerce Department's International Trade Administrations have found that between 2000-2009 the number of United States citizens travelling to Asia, South America, Central America, the Middle East, and Africa has grown almost 50% to around 12 million people annually (Rose, 2011). With statistics like these published, the demand for KNR has increased. While previously, KNR was primarily meant for business executives and wealthy families, it is now being used for anyone who works, travels, studies, or volunteers in an uncertain environment (Lang, 2012). 38% of corporate resilience directors have indicated that they think they are under resourced and their organization will take on more risk in the upcoming year (Kidnap and Ransom Insurance, 2012). Hamilton Dorsey Alston Co., a risk management and insurance service located in Atlanta, reports that only ten years ago 10% of their clients had an interest in a KNR policy. This number has grown over 50% and now around 70% of their clients have interest in the same policy.

Traditionally kidnapping involved people who travel for business, wealthy local people and their families, or employees of high-profile organizations. This is no longer true because any person who possesses something that a kidnapper wants can become a victim to a kidnapping. Some reasons for targeting a victim would be for money, as a way to gain publicity for certain groups, or as a way to put pressure on the government ("Spotlight on kidnap and ransom," 2004). Kidnappers who ask for ransom payments receive up to \$300 million each year (Aldred, 2001). Outcomes of kidnappings vary, but one study found that 64% of victims are released with their

ransom being paid, 18% are released without payment, 10% die, 6% are rescued, and the remaining 2% escape (Posthuma & Garcia, 2011).

There are many different types of kidnappings. All situations that involve a person in danger should be taken seriously and with proper precaution so damages can be kept to a minimum. The most popular forms of kidnapping are classic, express, virtual, and tiger. Classic kidnapping is when a victim is followed by their kidnapper for any time period between a couple days to multiple weeks. Classic kidnapping involves the participation of various people and may be the most difficult kind of kidnapping to achieve. The kidnappers must help negotiate ransom money with the victim's employer or family, and arrange a method for the victim to be picked up and returned home (Chaskin & Noel, 2011).

Express kidnappings are easier to achieve and have recently been at an all-time high. They involve a victim being forced by a kidnapper to withdraw the maximum amount of money from an ATM. The victim may be kept overnight and forced to do the same thing the following day. Sometimes the victim will be required to go back to their hotel room and give all their money and valuables to a kidnapper. There has been a rise in the number of express kidnappings because not only are rich people targeted, but also people with less wealth (Kidnap & Ransom, 2014).

The next two types of kidnapping are less known but have recently developed and are starting to become more popular. Virtual kidnapping has recently started in Mexico and Latin America and involves the kidnapper obtaining confidential information about a person, getting in contact with their family, and convincing the family that a kidnapping has taken place and they must send a ransom payment. (Chaskin & Noel, 2011).

Finally, the last type of kidnapping has had the majority of their victims from the United States and Western Europe. It is called tiger kidnapping and is when the “kidnapper” persuades an employee into robbing their employer by holding the employee’s family hostage. This type of crime is less likely to be reported to authorities because the victim has committed a crime themselves (Ryder, 2002).

## **2.4 Advantages and Disadvantages**

Advantages of KNR include financial security in the event of a high ransom for a kidnapping. In the event of a sudden kidnapping, an individual, or a company, can take a big financial hit. Insurance would help to minimize this damage, allowing companies to feel more confident in sending their employees away to pursue opportunities. Another advantage of KNR includes having a team of negotiators who can work on the situation much more effectively than the average person could (The Economist, 2006). Professional negotiators not only would take the load off the shoulders of people who have no experience in these situations of working with criminals, but would also likely end the kidnapping with a better outcome than if the situation had been handled by non-professional negotiators.

Disadvantages include the expense of paying for an insurance package that may not get any use, and possible abuse by the customer. An example of the latter would be an event where an insured customer fakes a kidnapping and receives a ransom payment, keeping the money for themselves. This can be mitigated if an employee is not permitted to know that they are insured against kidnapping. If the employee doesn’t know they are insured, they will likely take less risks and be safer against kidnapping, and won’t have any motive to fake a kidnapping. This would also negate another issue: if a client knew about their insurance plan and discussed it in

public, even with friends, then that information could be heard by a potential kidnapper (The Economist, 2006). The kidnapper would then be more likely to abduct the client since they know that the client has a plan to pay out any kidnappers (The Economist, 2006). The only advantage to letting the employees know they are insured is that it can help them avoid being killed (The Economist, 2006). A kidnapper would be more likely to allow an insured client to live, lest they have to deal with the authorities.

## **2.5 Potential Risk**

Of all people who are victims of kidnapping, about 22-24% are traveling business professionals (Posthuma and Garcia, 2011). In order to minimize the potential risk, instructions on how to avoid kidnapping situations can be included with the insurance package, so as to cut down on the number of kidnapping cases. If traveling employees know how to minimize their risk of being kidnapped, the number of cases of kidnappings will decrease.

The area with the highest risk for being kidnapped is Latin America, with 48% of all kidnappings (Posthuma and Garcia, 2011). People living in or traveling to Latin America would need more expensive, and possibly extensive, insurance packages to cover their higher risk in order for the insurance to be profitable for the seller. The process of assessing the risk and eligibility of a client for this insurance is called underwriting. In order to protect themselves against huge losses, insurance companies hire underwriters to find and eliminate high-risk clients. Underwriters are able to find the high-risk clients by evaluating the applications and required documents that applicants need to send in (Understanding the Insurance Underwriting Process, 2013). Underwriters assess if a potential client is too risky or plans on traveling to



locations that are so risky that the insurer simply won't cover the risk. We go more into detail about these locations later in our paper.

## **2.6 How to sell an insurance product**

In order to sell an insurance product, new entrepreneurs need to follow these three steps:

1. Develop an insurance product model
2. Develop the premium for the product
3. Go into business

A mathematical model is built with the purpose of predicting possible outcomes of a real world occurrence (Dabbaghian). In developing a model, there are many questions to consider: what do we want to know, what do we already know, what is the need for making the model, what will our model predict, and, when our model is complete, are the results valid. As a starting point, we observed current KNR applications from the companies stated earlier and the information they require from an applicant. Based on these applications, we can determine what some of this information would be:

- Applicant's total assets and revenue
- In the coming year:
  - Number of trips
  - City & country of destination
  - Number of people who travel to a destination per trip
  - Average length of trips
- Locations of any permanent foreign offices
  - City and country

- Number of locations
- Type of operation
- Number of employees
- Whether or not anyone has already been kidnapped. If so,
  - Date of the incident
  - Financial losses as a result
  - A description of the incident
  - How it was handled by the applicant
- Amount of coverage applicant wants

Once we have the information from an applicant, we must know how each individual piece affects an individual's odds of being kidnapped. For example, knowing the percentages of getting kidnapped in each major country destination, or knowing the odds of an individual getting kidnapped as opposed to a group of 4 or 5 individuals. Each one of these aspects would influence the final product of the model, the cost of insuring an applicant, and from here, we can accurately determine a fair price for their insurance package.

There are many factors that go into developing insurance premiums. Every company looks for a certain factor that would put them ahead and allow them to give a cheaper premium while keeping their risk to a minimum. This is why insurance companies ask so many questions before giving customers a quote. Despite these differences there are some common factors insurance companies have when developing premiums. A major number which insurance companies need to calculate is the loss factor. This is how much damage is expected to happen and how much the insurance company will need to pay for this loss. The goal of an insurance

company is to not lose money, which could easily happen if the magnitude and frequency of a loss is predicted incorrectly. In order to make the best predictions, insurance companies must look at all data from past accidents. Next, companies must consider the expense factor. These are expenses that the company will face such as loss control inspection reports, costs from obtaining previous claim information, and legal costs from settling claims. On top of this, insurance companies also have to try and figure out how much they want to make and how they are going to maintain a profitable return (Austin, 2007). Another important factor companies need to consider is interest rate. A premium is paid every year and if the money spent on a premium is not used because there is no accident, then the money is invested so that more money can be made and profited (“Determining the Value of Life Insurance Premiums,” 1996).

When starting a business, there is a lot of research one must do to get their company up and running. For example, you have to decide what legal structure your business will be. There are five legal structures that a business may have: sole proprietorship, partnership, corporation, S Corporation, and a limited liability company (LLC). A sole proprietorship has someone who owns an unincorporated business by him or herself. In a partnership two or more people contributes money, property, labor or skill to a business and expects to share in the profits and losses of the business. A corporation is owned by shareholders that buy stock into the business. S corporations are corporations that elect to pass corporate income, and losses through to their shareholders for tax purposes. An LLC is not a corporation but allows shareholders, while still having an actual owner. It is a form of a company that provides limited liability features of a corporation and still is able to operate as a partnership (IRS, 2014). It is important to know what kind of structure one wants his or her business to run under because they are all taxed differently

and the startup costs will differ. For our company's purposes, we would consider ourselves to be a corporation.

There are many costs that need to be considered in order allow the business to run efficiently. According to Investopia, a few generic costs that are common to all business types that one should to take into account for are license and permit fees, equipment and supplies, marketing, employee expenses, and technological expenses (Morah, 2014). Employee expenses may include wages, salaries, and benefits. Technological expenses may include computers, office software, and accounting and payroll software. Another cost that will be incurred is the cost of rent or lease for office space and the furnishing of the office.

## **2.7 Conclusion**

In short, KNR is a good insurance product to have for a niche, but expanding, client base. As with all types of insurance, it will relieve clients' stress and fear of huge financial losses that would otherwise result in a company going out of business, or worse, perhaps fatal consequences for an abducted individual. Companies who purchase insurance for their clients will be less apprehensive towards sending their clients overseas to pursue business opportunities. Wealthy and middle-class individuals and families will be feel a little more at ease when traveling abroad. The increasing demand for KNR has led big insurance companies like Travelers and AIG to sell KNR to an expanding market. Continued growth in the demand for KNR coverage means there is an opportunity for another company to get into the market place.

## **Chapter 3: Methodology**

As we have noted, the goal of our project was to examine an insurance company's pricing process for Kidnapping and Ransom insurance and develop a premium that would be charged to customers and be profitable to our company. To meet this goal, our objectives were to:

- Create our product
- Research and Gather data
- Develop a model to calculate a premium
- Simulate the model
- Analyze Results

### **3.1 Create our Product**

The first task our team had was to create our product. We needed to decide what our policy would cover and what information we would need to gather from our customers to calculate a premium for them that would cover the potential cost of what our policy would cover. We completed this objective by creating our own application for potential customers to fill out. This application outlined what we needed from our customers, thus the input variables that were used to calculate a premium in our model. We created our own application by comparing various KNR applications that we had looked at in our research from the companies stated in an earlier chapter.

### **3.2 Gather Data**

Once we figured out what our policy would cover, we started gathering data to calculate a premium. Our team needed to find the best data possible in order to calculate the most realistic expected claims. The data that was needed includes:

- Probability of being kidnapped by country and industry
- Employee's salary by industry
- Cost of crisis management team, security, and recording equipment
- Medical cost
- Ransom

To find the probability of being kidnapped, we needed to know how many people are being kidnapped per year in each country, as well as how many people visit each country per year. Once a base kidnapping rate is determined for each country, the customers' expected travel frequency as well as the length of their stay adjusted the rate to suit the customer. Our main source for these statistics was online government reports and databases, though when those were not options, other reports by private companies or news media was our next option.

These numbers were hard to find since most of these cases are kept confidential, and a majority of kidnappings aren't reported. Our team reached out to insurance companies that sell this product and tried to gain any insight they can provide us with. We reached out to companies such as Travelers, AIG, and The Olive Group. For any data that we could not find, we had to make estimates based on supporting evidence.

We also needed to gather information about what goes into starting a company and how much it would cost us to get it up and running our first year. We needed to establish how many people we need to employ, what their salaries and benefits would be, how much our office rent would cost, the cost for licenses, and what we would need to furnish our office with.

### 3.3 Develop Model

After our team had all the data, we used Microsoft Excel to store all the data we found and to calculate the premium. It was essential for us to develop an appropriate model that would allow our company to attract investment and become profitable in the future years. Pricing our product is an essential step to our success. If the price is too high, we cannot get enough customers and the company cannot earn much revenues. If the price is too low, we will have the risk of having insufficient funds to support our company and to pay for the claims. In either case, our company would suffer a loss. A good model can not only make our business profitable, but also gain customer's satisfaction. After a customer completes our application, the respective model will output the premiums for the next year. Our product has two payment options: they can pay for the premium at the beginning of every month or they can pay for it at the beginning of the year.

In a spreadsheet, our team was able to incorporate all of the data we collected in a model that can calculate different aspects of our product and bring it all together and calculate a final premium. The general idea of our model is that we multiply the possibility that a kidnapping event will happen in every destination and the estimated cost we are going to cover if we receive such claims. Our product covers the employee's salary up to 30 days, the ransom we will pay for the kidnappers, and the cost of a crisis management team, medical costs, and expenses such as security or recording equipment. Once we found the expected value of these costs, we could incorporate them in our total expected claim. Here is the equation shows how we calculated an expected claim for each destination:

$$\begin{aligned}
& (E[\textit{ransom paid}] + E[\textit{mployee's salary}] + E[\textit{other costs}]) \times \text{Pr}(\textit{being kidnapped}) \\
& \quad \times (\textit{Frequency multiplier}) \times (\textit{Kidnapped in group rate}) \\
& \quad \times (\# \textit{ of employees attending trip}) \times (\textit{Premium loading}) = E[\textit{Claim}]
\end{aligned}$$

The total expected for every customer is the sum of the expected claims for all the trips they will have for the next fiscal year. The premium will simply be the present value of the total expected claims after adjustments for business expenses.

### **3.4 Simulate Model**

Once our model is fully developed, we simulated the future years of business to capture the profitability of our product. It was necessary to make sure that we developed our model correctly and to see if any adjustments needed to be made to make our business more profitable. We did our projections in Excel. With the simulation we were able to randomly choose a large number of scenarios and calculate our year-end profit as if the events actually happened.

### **3.5 Analyze Results**

After simulating future outcomes we needed to analyze our results. By analyzing the simulation results, we were able to check to see if we could improve on any area in our model, and make sure that nothing went wrong. We needed to make sure that with this model our company was profitable and covered our annual expenses as a company. If there was anything off about our model, we then had to go back and make adjustments.



## **Chapter 4: About Our Product**

The goal of our project is to create the most competitive product possible. In order to create a competitive product we had to do research on our competitors. After extensive research on KNR policies from Travelers, AIG, Chubb Group, Hiscox Ltd., and Ace Group, we were able to decide what was essential for our product to feature and what could do to make our product stand out.

### **4.1 Coverage**

Our product covers what most policies on the market will cover. Insurance covers ransom, hostage negotiators, security, a kidnapped person's salary for up to 30 days, medical care for hostages after release, and advice to lower the risk of abduction in the first place. The insurance ranges from \$500,000 to \$10 million. Those covered will include the employees of the company and the employees' families. We will not cover an amount that is above a company's net worth.

There will be some countries that we will not cover simply because the location is too risky. To evaluate if a location is too risky, we have to stay on top of the news and up to date with government travel warnings. If the government has issued a travel warning to a place that is subject to political unrest or war, then we simply won't cover that location.

### **4.2 Crisis management team**

The crisis team that manages the hostage negotiators, translators, and security is a key component of our policy. All major KNR policies include the cost of services of crisis management and security consultants. These consultants provide advice to the insured's family or employer on how best to respond to the incident. Crisis managers have accumulated a wealth

of expert knowledge about economic kidnappings. They take the tremendous burden of dealing with kidnappers away from a company, and prevent emotions from taking over and worsening an already tenuous situation. According to an article written by Michael Henk, an actuary at Milliman, “these firms usually have a relationship with kidnappers. They know who to trust, who can be bribed, and how much resolution is going to ultimately cost”(Henk, 2013).

### **4.3 Application**

After we decided what our product would cover, we had to figure out what information we will need to extract from our clients to calculate a premium for the policy. We compared the application forms of the companies listed earlier and tried to understand why they asked for the information asked for and how they might use it. Our team decided that we needed to collect general information about the company, the company’s travel plans, and the policy limit that the company is requesting. Our application can be found in Appendix A.

General information about the company includes: what industry the company is in, how many executives, officers, and other types of employees are employed, and the company’s net worth. The company’s net worth allows us to evaluate if we can cover the policy limit that is requested. We need the industry because some industries are more at risk for being kidnapped depending on what location they travel to. The industry will also serve purpose when accounting of the 30 days of salary that would be covered in the case of a kidnapping. The number of people employed broken down by an employee type is not typical and is not asked for in other applications. We ask for this information so that we can calculate an expected value of an annual salary for one employee.

The travel information includes: where they're traveling in the next year, how frequently are they traveling to that location, how long are they staying, and how many people are planning on going on these trips. All of this information will be needed in calculating the premium.

#### **4.4 Lowering Risks**

When a client is insured with us, we will do our best to make sure that the employees that work at that company are aware of the risks of being kidnapped while traveling and make sure that the company informs them on how to lower their risks. We will provide each client with brochures outlining the facts and provide professional advice on how to behave when away on business.

## Chapter 5: Gathering Data

In order to determine what sort of information we needed in our model, we looked at currently existing insurance policies. Based on forms from Travelers and AIG, we found that we needed to have statistics on kidnapping rates in countries, and how this rate was affected by length of stay, type of industry, number of employees traveling, and frequency of travel. We also found we needed the salaries of employees to help determine the premiums. Finding information on these factors proved to be quite difficult.

The first data and information we tried to find was what we thought would be the easiest to find: the operating costs of our business. For this data we found costs for rent, water, electricity, internet, marketing costs, and salaries. We discovered that in order for our business to run smoothly we would need to initially employ one underwriter, one secretary, one actuary, one claims examiner, one auditor, and one person for customer service. All of the data that we found can be found in Appendix E: Annual Expenses & Startup Costs.

Even before we began researching kidnapping rates, we knew that we would not be able to find a rate for every country. To help remedy this, we divided all of the countries that we would cover into categories based on risk. With these categories, we can estimate the rates for countries that we can't find statistics for using the rates for countries that we do find rates for.

Most of the statistics that we found came from Nation Master, a website that serves as a massive collection of data for various countries. While this site was very helpful being the only place to get actual numbers, it didn't go without speculation. Almost all of the numbers on this site were fairly old, ranging from 2010 down to 2006. Ideally, we wanted numbers from 2013 for our model, as the number of kidnappings can change greatly from year to year, especially with

how it had been growing in recent years. Another setback was that some numbers, though not all, from countries that we had already found statistics for disagreed with our data. We attributed this to how old the data on Nation Master is. However, despite these issues, this site was the only place where we could find decent statistics, so it was certainly better than having no data at all.

The rest of the kidnapping data came from news media and government statistical reports, mainly from the native countries that we were seeking data for. The news sites were helpful since their numbers were much more recent, from 2010 to 2013, and were consistent with the other data from countries in the same risk category. A select few numbers seemed to be rounded to the nearest thousand for simplicity's sake (for example Brazil had a record of "around 1000" kidnappings per year), but they were the best numbers we had, so there wasn't much we could do. Another minor issue was that an article would declare that a country is "high risk", but will give no numbers to back up that claim. The government reports from the foreign countries were more precise, and were all from 2010 to the present.

We used the website [worldbank.org](http://worldbank.org) for international tourism statistics. World Bank had records from 2010, 2011, and 2012 for nearly every country we needed. We used the international tourist arrivals to determine the rate of how many people were kidnapped in a country out of how many people visited that country. We found that the only countries we didn't find tourist arrival numbers for were countries such as Somalia that were given travel warnings by the U.S Department of State. We decided that we would not provide coverage for any country listed with a travel alert or travel warning by the U.S Department of State. The danger associated with these countries makes them too risky to cover and this proved to be a common practice among other KNR providers.

We ended up finding data for over half of the countries on our coverage list. This is expected since kidnappings are not an easy statistics to keep track of. Once we finished searching for data, we took averages for all of our risk categories using our existing data. Once each category had an average value, we used this value in place of any missing statistic for a country on our coverage list that didn't have a kidnapping rate.

The medical data we found includes costs of Emergency Room visits, the odds of visiting different levels of the emergency room, and expected physical and mental health care costs. The emergency room costs range from levels 1 to 5, and we got these numbers directly from the healthcare bluebook. We also found the odds of going to any level, from the Center for Disease Control and Prevention website. Using these numbers we determined the expected physical medical cost. The National Institute of Mental Health provided the data for the average mental health care cost. Using these two statistics we calculated the expected cost for both mental and physical health care, since kidnapping victims will likely need both services after such a traumatizing event.

Unfortunately, we could not find data that allowed us to find out how kidnapping rates depending on a client's length of stay in the foreign country were correlated. We did, however, find a report on aid workers that supported the fact that the longer one stays somewhere the better the chance of being kidnapped. The report states that in order to prevent a kidnapping, aid workers are taught to vary travel times and routes when moving between residences and offices, as well as in off-hours activities"(Harmer, Stoddard, Toth 2013). The article states, "Aid practitioners interviewed for this report made the point that kidnappings generally happen to individuals who are not following SOPs for risk avoidance – often because they have grown complacent after working in the context for a long time. Diligence is difficult to sustain over an

extended period of time, and is inevitably more challenging for national staff, for whom the security standards at work will be higher than they are otherwise accustomed to, and more difficult to follow in their off-hours private life” (Harmer, Stoddard, Toth 2013). Thus, meaning that when a person stays in a location for a long period of time, they are likely to form a schedule, which puts them at a higher risk of being followed and kidnapped.

We sought help from actuaries currently in the insurance field when our research no longer yielded progress. We actually heard back from two individuals willing to offer assistance to us. First we chatted with Michael Henk, an actuary at Milliman. Our team asked him to if he could provide us with any data that he could legally allow us to use and for any advice given his experience in the field. Unfortunately he could not provide us with real data, but he did give us his expert opinion on some of our questions. In regards to medical expense he told us, “Honestly, I'd think that the medical expense liability for a kidnapping claim is likely a minor portion of the ultimate claims expense. There's so much covered in the event of a kidnapping, from the security consultants, to independent investigators, to things like personal financial loss, 30 days of rest& rehab for the victims, that seem like they would quickly add up and overwhelm the medical expense.” In terms of what industries are most at risk, “Typically industries that operate with a large workforce in high risk areas are obvious targets. I'd say the most "at risk" would be westerners working in the energy sector in the Middle East or South America. Though, with the instability in the Middle East, any western company that does business is at risk. But, since companies know that, they're restricting travel in the area, so you need to just think about industries where traveling to the risky parts of the world are unavoidable. Three that pop into my mind are the energy sector, journalists, and humanitarian aid personnel.”

We also got to speak with Greg Nelson, a consultant at Western Growers Insurance Services. He explained to us that his company does not work with developing the product, they only sell it, and thus his help was limited, but appreciated nonetheless. He was able to provide us with some of the trends he has witnessed since his company has been selling this product. He told us that a company going to the same abroad location more than four times a year is very rare. He explained to us “premium should get more expensive the longer people plan to stay in a location.”



## Chapter 6: Developing a Premium

### 6.1 Introduction to the model

Based on the data we have, we are going to calculate our premium by the following equation as we mentioned in the methodology chapter:

$$(E[\textit{ransom paid}] + E[\textit{mployee's salary}] + E[\textit{other costs}]) \times \textit{Pr}(\textit{being kidnapped}) \times \\ (\textit{Frequency multiplier}) \times (\textit{Kidnapped in group rate}) \times \\ (\textit{\# of employees attending trip}) \times (\textit{Premium loading}) = E[\textit{Claim}]$$

The annual premium for every customer is the sum of the premium for all the trips they will have for the next fiscal year.

#### Expected Value of Employee's Salary

We have a dataset to store all the salaries for 18 industries. Once the customer fills out the number of executive employees, officers, and other employees, we can calculate the average of their salary according to the company's industry. Since we only cover the employee's salary up to 30 days, we assume that the possibility of days we will pay for the salary is uniform distribution during the 30 days, meaning that each day the probability of being kept is 1/30, and calculate the expected value of employee's salary up to 30 days. Once we have the company industry information, number of executive employees, number of officers, and the number of other employees, we can calculate the expected salary we are going to pay once there is any claim.

### **Expected Ransom**

Ransom is a large portion of the claims we are going to cover. Most kidnappers will ask for ransom, but for different countries the ransoms are very different. For example, only 20% of kidnappers ask for ransom in Pakistan. We have such a dataset to store all the ransom statistics for different countries. Because we can only reach limited resources for the ransom data, for all the countries that we cannot find specific data, we use the average ransom, which is \$ 50,000. Once we have the destination country from the input, we can find the corresponding ransom amount.

### **Other Cost**

Our product does not only cover the ransom and employee's salary during the time they are kidnaped, but also provide other services, such as security guards, negotiation team, 24/7 recording for the hostages' family, and any physical and mental medical cost for the hostages. We will also cover this cost as additional cost to our model. With the limited resources, right now we have that as a fixed cost for the entire kidnapping event. In other word, this part will not change with the inputs changing.

### **Multiplier by Travel Frequency and Length of Stay**

According to the information that Mr. Nelson provided to us, we know that if a person stay at a place for a longer time, the possibility of being kidnapped will be higher. In addition, if a person travels to a place very often, the possibility of being kidnapped will also increase. Based on this fact, we created a two-way table to show that the premium of a trip will increase with the increase of travel frequency and length of stay. Once we have the travel frequency and length of stay information from the input, we can find the multiplier from the following table.

Length of Stay	Short (less than a week)	Medium (1 week to 1 month)	Long (more than one month)
Travel Frequency			
Infrequent ( less than 3 times a year)	1	1.05	1.1
Frequent (less than 5 times a year)	1.05	1.1025	1.155
Very frequent (more than 5 times a year)	1.1	1.155	1.21

### Multiplier by number of employees in every trip

With larger groups, the employees will have less chance to be kidnapped. So we developed a table to estimate the multiplier by the size of travel group.

Size of Travel group	Multiplier	Size of Travel group	Multiplier
1	1	9	0.8
2	0.9	10	0.7
3	0.9	11	0.7
4	0.9	12	0.7
5	0.8	13	0.7
6	0.8	14	0.7
7	0.8	15	0.6
8	0.8	15+	0.6

All the data in this table is estimated and we will revise in the future once we have collected our own data based on the claims we see. Once the customer fills out the number of employees in a trip, we will have the multiplier corresponding to the group size.

## The Possibility of Being Kidnapped

We have a dataset to store all the possibilities of being kidnapped for different destinations and industry types. Once we have the destination country from the inputs, we will have the possibility of being kidnapped based on where the destination is and what industry the company is in. Also, as mentioned earlier, there will be locations that our insurance simply won't cover.

## 6.2 Yield Interest

In order to provide most convenience ways for our customers to pay for the premiums, we decided to provide two payment options: monthly payment or annual payment. There will be slightly difference between these two payment options. We determined to use the yield interest to set the premiums for different options. The interest we use is the average of the 2014 United States daily Treasury Monthly yield Curve Rates. The annual interest rate equals to 0.34%. This annual interest rate can be converted into monthly rate of 0.028%. The following actuarial payment formula is the one we followed to calculate the monthly premium:

$$\text{Monthly Premium} * \ddot{a}_{\overline{n}|i} = \text{Claims paid at the beginning of the year, where } n = 12$$

## 6.3 Premium loading

We also wanted to add a premium loading into our equation as a direct source of profit. At first we thought that a 10% loading would suffice, but as mentioned later in our paper, we experimented with 10%, 20%, and 30% premium loadings. The premium loading would not only provide a profit, but also eliminate some of our business risk.

## **6.5 Total Premium**

Once a customer fills out an application and our company has assessed their risk and collected all of their information, the model will calculate the expected claims for each trip that the company plans to go on. The total premium will be the present value of all of the expected claims. The data for the expected claims is necessary because the premium needs to be able to cover future claims. Otherwise, our company may not be able to fully insure our customers.

## Chapter 7: Simulation

After creating the premium model, we created a simulation model that would test our profitability over a 10-year period. We ran a simulation for each year 1000 times. Each simulation run is independent trial of every other simulation run.

### 7.1 Inputs

There were three inputs that were factored into our simulation model.

- Annual interest rate: 0.34%
- Annual Expenses: varied depending on the year in the simulation
- Number of trials: 1000

The annual expenses varied depending on the year in the simulation because our simulation also simulated growth over the 10-years. Thus, each year our company grew by a percentage. You can see our company growth plan in Appendix B. Please note that our growth plan has no negative growth. This is a result of our research of the KNR market. We predict that the market is on the rise and our company can only grow. This means that each year a few more clients were added to our simulation and depending on how big how client base was, our company had to hire more employees so our annual expenses grew. Also the first year was a little more expensive than the next few years due to initial startup costs.

### 7.2 Randomizing the Customers

The first variable in our simulation model that we focused on was our customers. We needed to be able to encompass companies of all different sizes and industries in order to ensure a fair simulation. To do this, we randomized the industry type of a company and then randomized the number of different types of employees. When randomizing the number of

different types of employees we made sure that the number of other (general) employees was larger than the number of officers, and the number of officers was larger than the number of executive level employees. We also randomized the net worth of companies assuming that no company was worth more than \$50,000,000.

### **7.3 Randomizing Travel Plans**

The first part of randomizing the travel plans of a company was randomizing the number of trips they went on. We assumed that a company would travel to no more than ten locations. We made this assumption based off of the conversation we had with Greg Nelson. He had said that most companies usually travel to no more than four locations and that it was very rare for a company to go to as many as ten countries in one year unless they were a huge company that was based in multiple countries.

After randomizing the number of trips our model randomized 10 trips for every customer. For each trip, we randomized the country they were traveling to, how long they were going, how frequent they were visiting that country that year, and the number of people attending the trip. Only the number of trips that we had randomly generated the company to go on would be counted in our simulation and the rest would be considered null.

### **7.4 Randomizing Claims**

Once the travel plans were randomized, we worked to randomize when claims would occur. Using the probability of a person being kidnapped in a certain country and industry, we generated a random number between zero and one and compared the two. If the random number generated was less than that probability then a claim occurred in our simulation. Once a claim occurred, we randomized the number of days the victim was held captive, assuming it would be

no longer than 200 days. Next based on the number of days the person was held, we calculated the cost of the services of the crisis management team. We also randomized the medical cost of the victim. We did this by assuming that every victim would have to go the hospital after being released, and assigning percentages to the level of an emergency visit.

## **7.5 Data Summary**

After the information for each client and whether or not a claim occurred were generated, the data was aggregated in a way that was more meaningful for our analysis. The data that we collected for further analysis were:

- Number of Claims
- Total amount of Claims Paid
- Total Premium Collected
- Total Profit

The number of claims at most was five in one year, but on average it was less than one. The total amount of claims paid was simply calculated by adding up how much each individual claim costs.

The profit was the data that we were most interested in. Once we calculated the profit for each trial we could check the profitability of our product and analyze how many time we lost money and how many time we made money.

This data was collected 1000 times for 10 different years. Once the calculations for the 1000 trials for each year were ran we then analyzed how much profit we would make over the 10-year period. At first we found that we were losing too much money so we performed a more in depth analysis on the data and tried to find what was causing so many losses. We then made



adjustments and decided to test different growth plans, policy limits, and premium loading values. As seen in the chart provided in Appendix C, the three growth plans tested were high-growth, moderate growth, and low growth. The three policy limits we tested were \$500,000, \$750,000, and \$1,000,000. The three premium loading values we tested were 10%, 20%, and 30%. We then compared each situation given a certain growth plan, policy limit, and premium loading to see how it affected our profitability over the 10-year period.

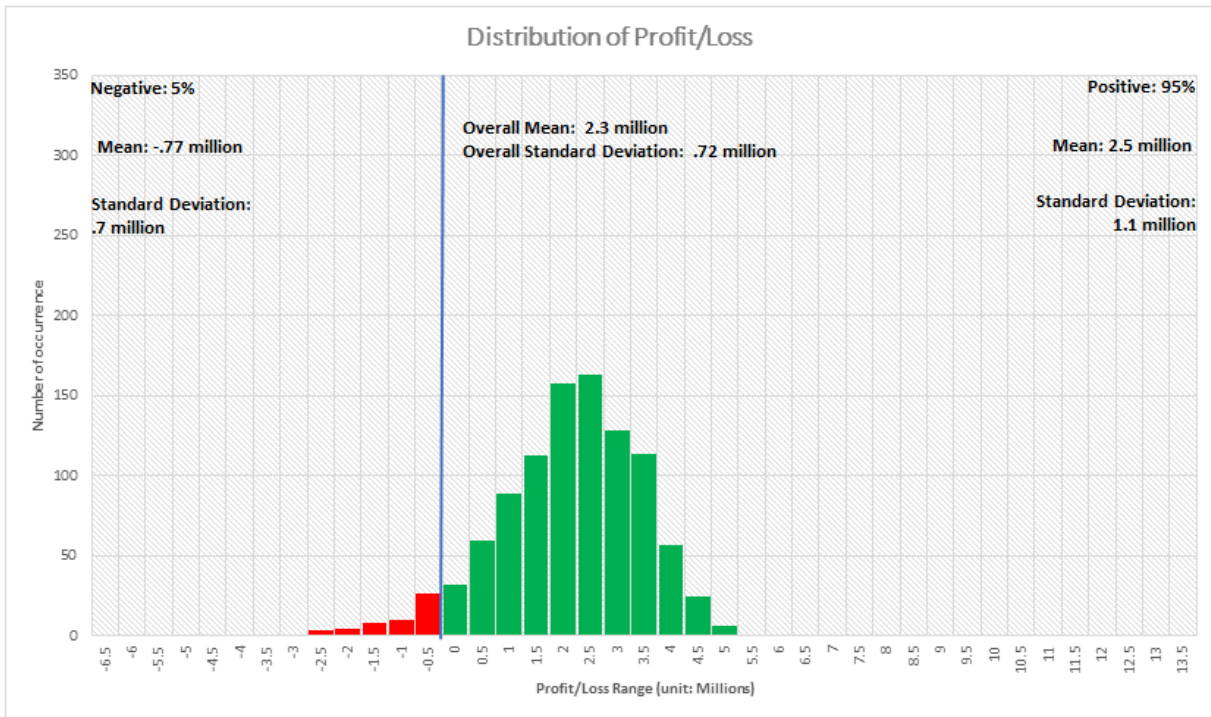
## **Chapter 8: Results**

The simulation was the key in creating data to analyze and develop solutions. With the outcomes of the simulation we were able to see if our company would be profitable and what factors increased the profitability of our company. We were able to test different premium loadings, growth plans, and policy limits to identify what would be the best one to use to have a successful business. We aimed to be as accurate with these results as possible so we ran the simulation 1,000 times thus producing data to give us more accurate trends.

### **8.1 Overall Results**

We began the simulation of our company by running our simulation 1000 times. The first case the team tested was that of medium growth with a \$1 million policy limit and no premium loading. We thought this would give us a good starting average to base our expected profits off of. Using these set variables we found that the average ten-year profit would be \$1.3 million with a range of profits from -\$3.4 million to \$4.8 million with a standard deviation of \$1.3 million. This is a wide range of profits with a high standard deviation so we tried to come up with other ways to analyze our results.

We decided to split the profits into both negative and positive sections. We found that only 15% of the profits are negative while 85% were positive. The average negative profit was -\$0.8 million while the average positive profit was \$1.7 million. The distribution of the profit followed a normal distribution as seen in Figure 1.



**Figure 1**

In the figure, the x-axis highlights the range of profit from -\$6.5 million to \$13.5 million while the y-axis shows the amount of times this occurred in the 1000 trials. The blue vertical line highlights where 0 is located on the x-axis. This figure makes our data easier to understand.

When just reviewing the data, it may seem as if our company has a high chance of losing profit, but when looking at the overall graph this is not true. A negative profit is highly unlikely, but we recognize that under certain conditions, there is still a chance of this to occur.

## 8.2 Further Analysis

Based on our trial case, our business seems like a profitable idea with low risk; however we wanted to see what would happen if we changed the policy limits and added on a premium loading to assure that our business will be successful. It is also not guaranteed that our business

will grow at the medium-growth plan we originally came up with so we tested also the results on a low-growth and high-growth plan.

In total we created 27 simulations. These simulations consisted of a different combination of policy limits, premium loadings, and growth plans. The policy limit is the maximum amount of money per year that our company would pay if someone were to make a claim. The premium loading is a percentage increase in our premium that is used to cover any expenses and assure our company is profitable. Lastly, our growth plan is how much we expect our business to grow over a ten-year period. We cannot know for sure how fast our business will expand and how many policies we will sell each year, but we can make educated estimates. We based our estimated off of our research of the industry and the current market for KNR. Our different growth plans can be seen in Appendix D: 10-year Growth Plans (Low, Medium, and High).

In order to understand these 27 simulations, we made a series of graphs. Figure 2 shows the graphs for a \$.5 million policy limit, Figure 3 for a \$.75 million policy limit, and Figure 4 for a \$1 million policy limit. The graph is the same format as Figure 1 and highlights the sum of our company's profit over ten years. The x-axis is the profit, which ranges from -\$6.5 million to \$13.5 million while the y-axis is the number of times this occurred out of the 1000 simulations. The green shows a positive profit while the red shows a negative profit. The blue line highlights where 0 is so it easy to see the trends as the graph moves to and from the breakeven point.

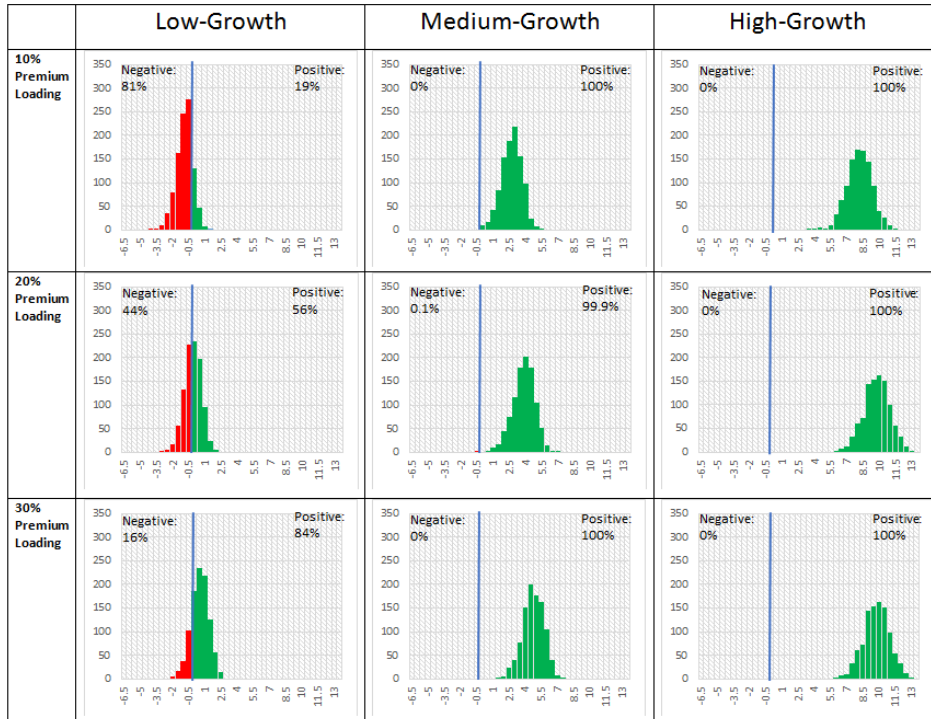


Figure 2: \$.5 Million Policy Limit

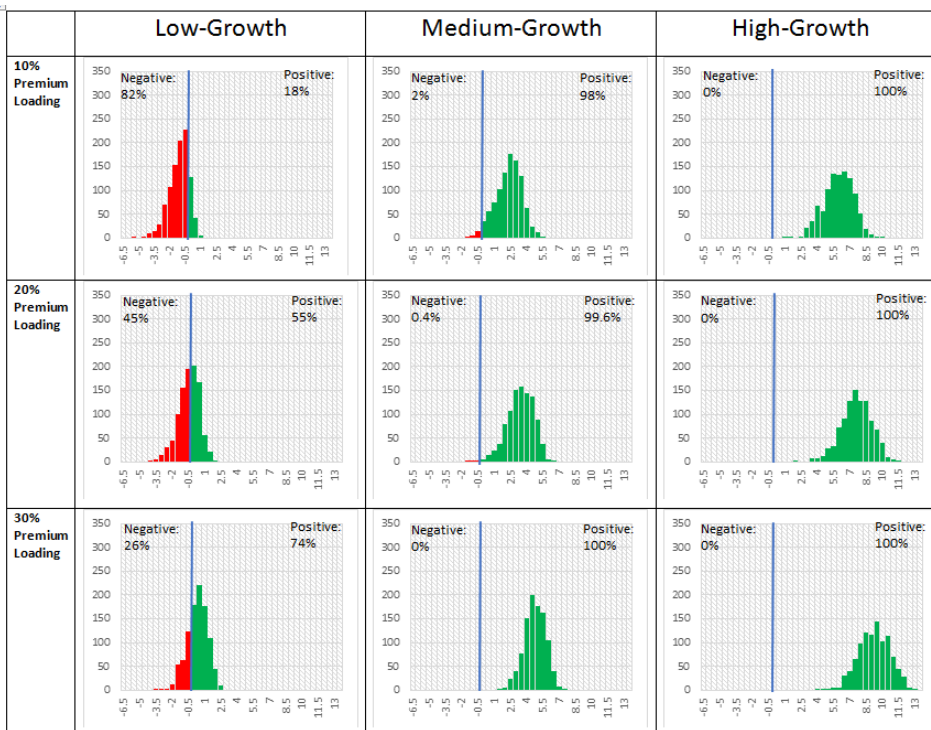


Figure 3: \$.75 Million Policy Limit

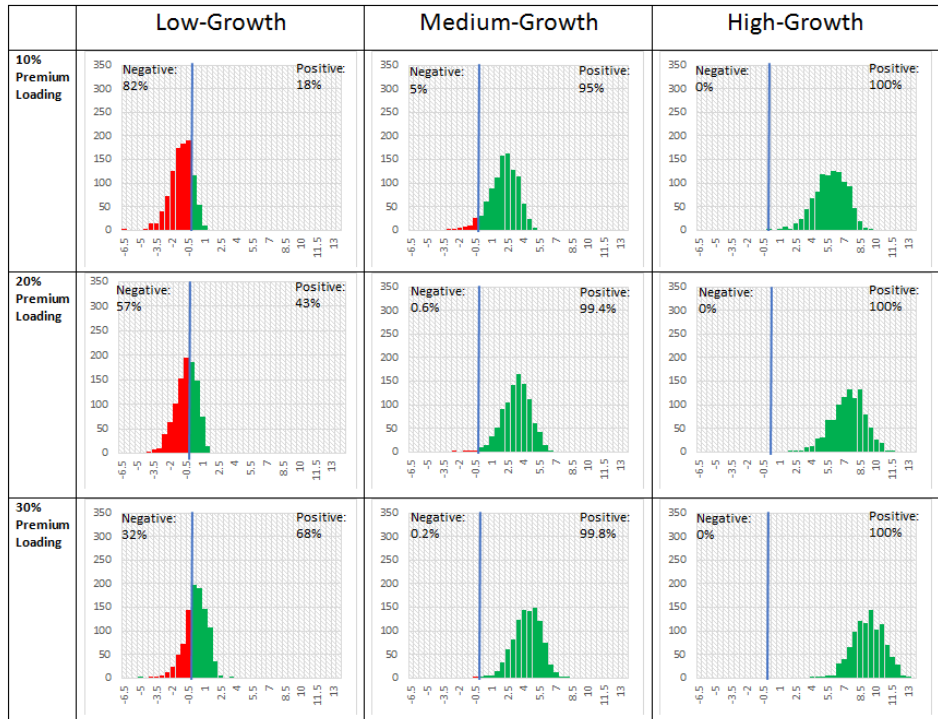


Figure 4: \$1 Million Policy Limit

It can be seen that all graphs show a similar normal distribution. As the premium loading increases and the growth plans increase, so does the profit. Also with an increase in policy limits, there is a decrease in profit. With the medium-growth and high-growth plans, our business is almost always making a large profit. To understand how these variables affect the premium, we broke down each variable and found how the profit was changed.

We tested \$.5 million, \$.75 million and \$1 million policy limit. We ran 1000 trials 9 different times for each policy limit with the different combinations of premium loadings and growth plans and then took the average of these 9 trials. We found out that as the policy limit increases, our average profit decreases slightly as seen in Table 1. This decrease is by less than \$1 million but it is still interesting to note.

<b>Policy Limits</b>	<b>Average Profit</b>
.5 million	\$4,662,790
.75 million	\$4,001,395
1 million	\$3,870,246

**Table 1: Policy Limits and Average Profits**

Next we looked solely at the variable of premium loading. We tested out a 10%, 20%, and 30% premium loading to see the effects on our average profit. Again, we ran each premium loading 9 times and took the average of the 9 trials to get the average profit seen in Table 2. As expected we found that as premium loading increased, so did the average profit. The increase was a little over \$1 million between a \$.5 million policy limit and a \$1 million policy limit.

<b>Premium Loadings</b>	<b>Average Profit</b>
10%	\$3,015,591
20%	\$3,190,634
30%	\$4,940,983

**Table 2: Premium Loadings and Average Profits**

Finally, we looked at how the different growth plans affect our profit. We tested out the low-growth, medium-growth, and high-growth plans and the results can be seen in. It can be seen that the different growth plans have the biggest effect on the average profit. There is about an \$18 million difference between the low-growth and high-growth plan.

<b>Growth Plans</b>	<b>Average Profit</b>
Low-Growth	\$533,968
Medium-Growth	\$3,690,643
High-Growth	\$18,309,819

**Table 3: Growth Plans and Average Profits**

### **8.3 Marketing Plan**

Based on our research, the target customers of KNR are usually the companies that are willing to buy such insurance for their employees who plan to travel overseas for business purpose. We would also like to set our target audience to be these companies. It is also the type of client that would get the most use out of this. Individuals traveling overseas likely wouldn't be able to afford the premium for their coverage, unless they were very wealthy, and companies that do not go international for business have no use for the insurance since we don't cover the U.S.

For marketing strategy, we have two options: Pull Strategy vs. Push Strategy. Pull strategy means the company will motivate customers to seek out the company's brand and come to buy company's product. Companies can utilize pull strategy in the following ways: advertising and mass media promotion, word of mouth referrals, and sales promotions and discounts. Push strategy means the company will take the products directly to the customers and ensure the customer is aware of company's brand when they purchase the product. Companies can utilize push strategy in the following ways: Trade show; direct sell to customers face to face, and negotiation with agency to sell your product. We decided on a push strategy, which is commonly used in the insurance industry. In addition, push strategy will allow us to ensure customers are aware of our product and reach more potential customers.



As stated earlier, to increase our profit and decrease business risk, we would like to add premium loading to our product. This will increase the premium. So it is very essential to set the correct premium loading so that we can increase the profit, while selling appropriate number of policies. Based on our simulation results, we decided to have 20% premium loading. It struck a balance between affordable and profitable premiums. The more affordable pricing compared to the 30% premium loading would bring in more customers, and the policies would be more profitable than the 10% loading policies.

#### **8.4 Return on Investment**

Our company is a start-up company, so we will need initial funds to start our business. We are hoping to get this money from someone willing to invest in our company and in order to get this we have developed a plan for return on investment that we can present to possible investors. We want to make investing in our company as low risk and high profit as possible.

The first step in doing this was to come up with an equation that would calculate the breakeven costs. We decided that in order to break even we must find out what our initial investment is. We found that in order to break even, we must make enough profit to cover 1 year operating expense + all start-up expenses + future claims for 1 year. After this expense is calculated, we must find out how much money we are going to give to investors each year. Once this is done, it is easy to see how many years it will take for the investor to breakeven and start making a profit.

## Chapter 9: Future Adjustments

The future of our product has many possibilities for success. We can do the best we can to predict how our company will do in the industry, but we cannot predict for sure how our business will develop. There are many more opportunities for further research in our company to come up with a more accurate prediction of the future while also take measures to help our business be more successful.

When looking at some of the results of the simulation, we noticed that a lot of the premiums that a company would have to pay between \$10 and \$50, or something else of a very low value. We think that something that may increase our profit and make sense in this situation is adding a price per policy. This would be a minimum amount of money a company would have to pay for their premium. We would research current prices in the KNR market while also testing different values in our simulation to find a price per policy that makes sense. Along these lines, we would want to be sure that our company would make a positive profit. Something that would help eliminate the negative profit would be a price per policy. Another technique we may look into would be coinsurance or cost sharing where the customer pays part of the payment which is being made towards their claim. These are things used to prevent excessive spending by the owner of the policy. It would also allow the options for the customer to have a lower premium if they take responsibility of more of their coinsurance. By allowing this to be an option, claims and premiums will be minimized and the company's profit will increase.

Lastly, our model is largely based off of our research of the market and what people who work in the market have told us. Some of the numbers we have come up with are educated guesses, which may not be as accurate as it can be. We used this data as a placeholder. As our

company's experience in the industry increases, we would have our own data such as the growth of our company, probabilities of kidnapping in different countries, and average ransom rates. This information would come from data from previous claims. We can easily put this data in our model to increase its accuracy on future predictions and company profit. For example, if after our first ten years of business, ten people out of the 1100 people who travelled to Afghanistan got kidnapped, we can use this data to properly predict how many people travelling to Afghanistan in the future will get kidnapped. Similarly, we can look for more factors that would allow us to find out who is most likely to be kidnapped and held for ransom. There may be factors such as gender, race, and age that we have not yet considered.

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# Appendices

## Appendix A: Kidnap and Ransom Coverage Application

### General Information

#### Applicant information:

1. Name of Applicant:	
2. Street Address:	
3. City, State, ZIP Code:	
4. Expiring Policy Number:	
5. Year Applicant's business was established:	
6. Applicant's Industry Type:	
7. Number of Executive Employees:	
8. Number of Officers:	
9. Number of General Employees:	

### Financial Information

Indicate the following as it relates to the Applicant's fiscal year end (FYE):	Most Recent FYE (Month/Year) (____/____)	Prior FYE (Month/Year) (____/____)
Total Assets		
Revenues		



**Requested Insurance Terms**

Effective Date	Requested Limit	Requested Retention

**Incident/Loss Information**

Has the applicant or any person proposed for this insurance been involved in a kidnapping, detention, hijacking, or extortion for ransom incident during the past?

*If Yes, please complete the table below:*

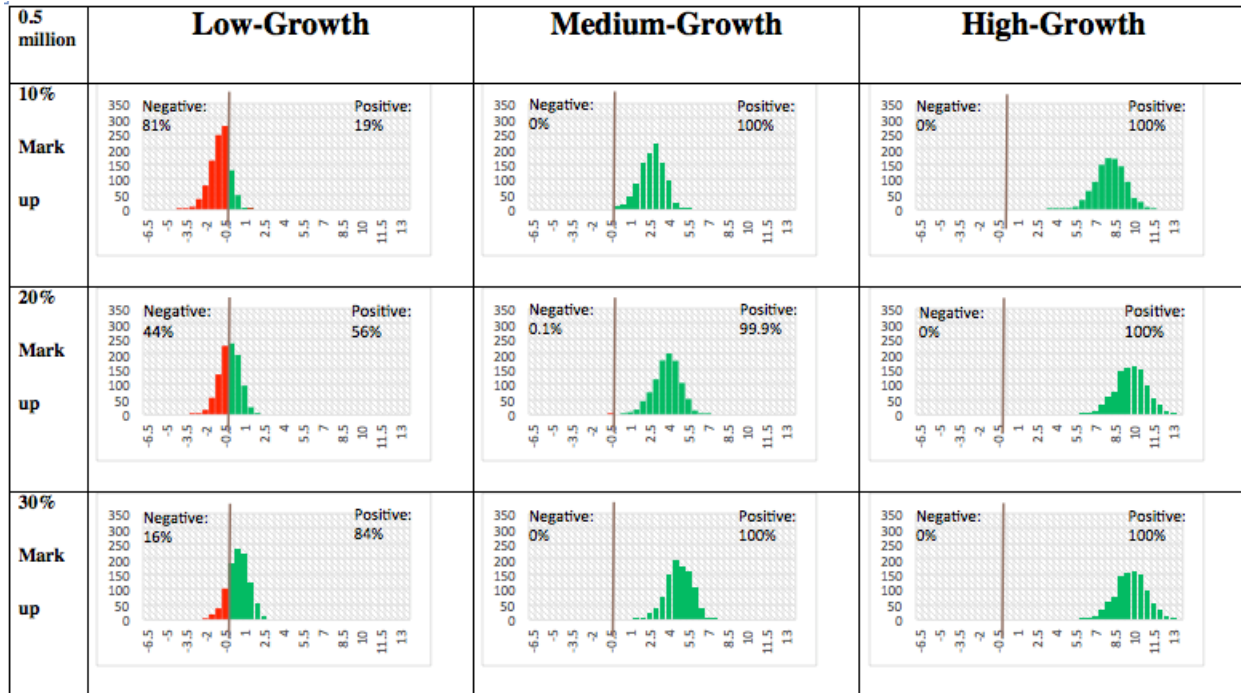
Date of Incident	Amount of Loss	Description of Incident	Corrective Procedures Implemented
	\$		
	\$		



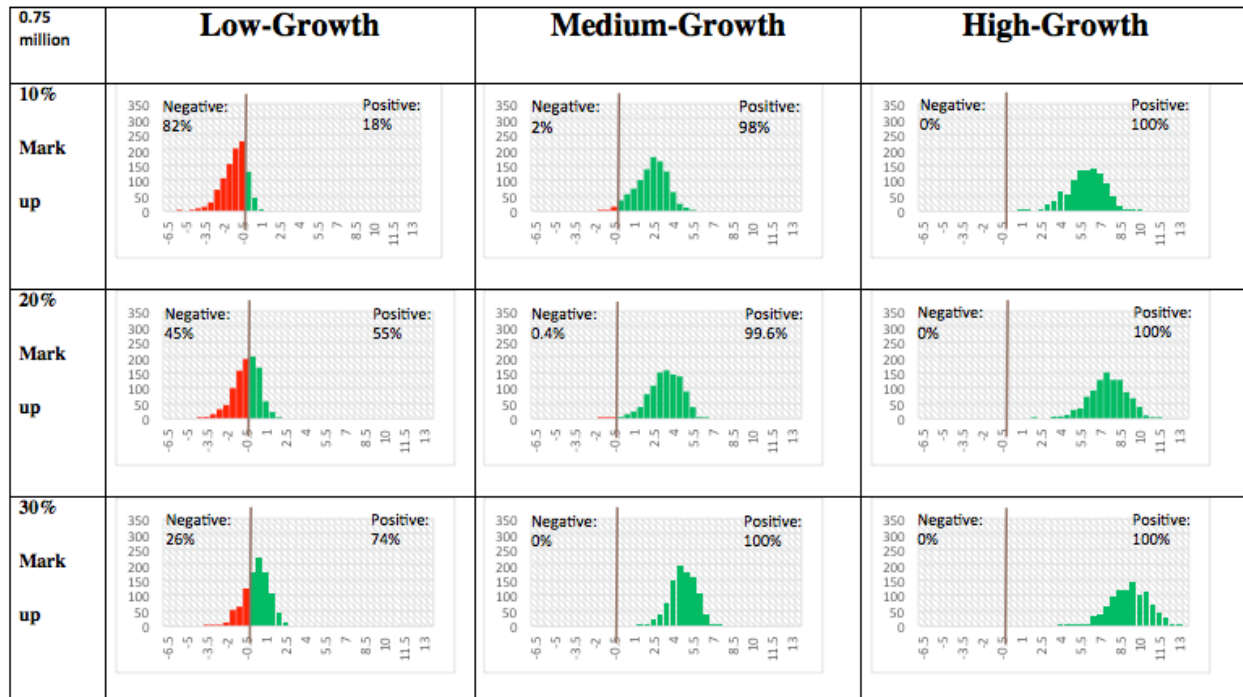
## Appendix B: Original Growth Plan (Medium)

Year	Medium-Growth	Annual Expenses	Notes for Expense Change
<b>1</b>	51 policies	\$735,811.76	First year operating cost and one-time startup cost
<b>2</b>	61 policies (20% Growth)	\$684,920.95	
<b>3</b>	74 policies (20% Growth)	\$684,920.95	
<b>4</b>	88 policies (15% Growth)	\$755,321.95	Hire one customer service
<b>5</b>	101 policies (15% Growth)	\$755,321.95	
<b>6</b>	117 policies (15% Growth)	\$755,321.95	
<b>7</b>	128 policies (10% Growth)	\$825,722.95	Hire one Customer Service
<b>8</b>	141 policies (10% Growth)	\$886,742.95	Hire one Claim examiner
<b>9</b>	155 policies (10% Growth)	\$886,742.95	
<b>10</b>	170 policies (10% Growth)	\$886,742.95	

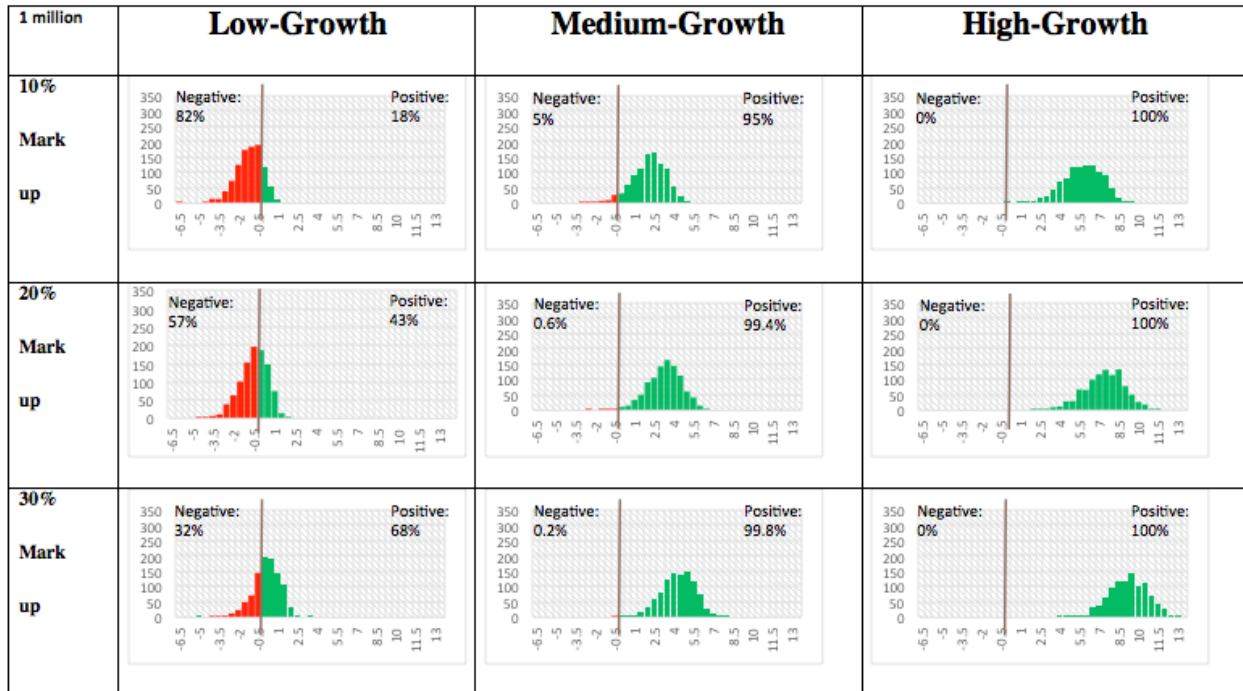
## Appendix C: Result Charts



0.5 million	Low-Growth			Medium-Growth			High-Growth		
10% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 0.3836	\$ 0.3057	Positive	\$ 2.9511	\$ 0.9439	Positive	\$ 10.0074	\$ 1.1994
	Negative	\$ (0.8822)	\$ 0.6337	Negative	\$ -	\$ -	Negative	\$ -	\$ -
	Overall	\$ (0.6466)	\$ 0.7660	Overall	\$ 2.9511	\$ 0.9439	Overall	\$ 10.0074	\$ 1.1994
20% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 0.6666	\$ 0.4668	Positive	\$ 4.0740	\$ 1.0093	Positive	\$ 8.4180	\$ 1.1572
	Negative	\$ (0.6162)	\$ 0.5062	Negative	\$ (0.3084)	\$ -	Negative	\$ -	\$ -
	Overall	\$ 0.1009	\$ 0.8004	Overall	\$ 4.0740	\$ 1.0093	Overall	\$ 8.4180	\$ 1.1572
30% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 1.0484	\$ 0.6273	Positive	\$ 4.9677	\$ 1.0169	Positive	\$ 10.0074	\$ 1.1994
	Negative	\$ (0.4877)	\$ 0.4243	Negative	\$ -	\$ -	Negative	\$ -	\$ -
	Overall	\$ 0.7964	\$ 0.8259	Overall	\$ 4.9677	\$ 1.0169	Overall	\$ 10.0074	\$ 1.1994



0.75 million	Low-Growth			Medium-Growth			High-Growth		
10% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 0.3629	\$ 0.2714	Positive	\$ 2.6568	\$ 1.1186	Positive	\$ 6.2084	\$ 1.3579
	Negative	\$ (0.1129)	\$ 0.8597	Negative	\$ (0.4635)	\$ 0.3693	Negative	\$ -	\$ -
	Overall	\$ (0.8650)	\$ 0.9725	Overall	\$ 2.5851	\$ 1.2018	Overall	\$ 6.2084	\$ 1.3579
20% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 0.6057	\$ 0.4445	Positive	\$ 3.6785	\$ 1.1880	Positive	\$ 7.8724	\$ 1.4220
	Negative	\$ (0.8913)	\$ 0.7097	Negative	\$ (0.6216)	\$ 0.3423	Negative	\$ -	\$ -
	Overall	\$ (0.2177)	\$ 0.9596	Overall	\$ 3.3661	\$ 1.2165	Overall	\$ 7.8724	\$ 1.4220
30% Mark up	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev	Unit: Millions	Mean	Standard Dev
	Positive	\$ 1.0050	\$ 0.6268	Positive	\$ 4.5645	\$ 1.2515	Positive	\$ 9.4804	\$ 1.4481
	Negative	\$ (0.7052)	\$ 0.6141	Negative	\$ -	\$ -	Negative	\$ -	\$ -
	Overall	\$ 0.5586	\$ 0.9763	Overall	\$ 4.5645	\$ 1.2515	Overall	\$ 9.4804	\$ 1.4481



1 million	Low-Growth		Medium-Growth		High-Growth				
10%	Mean	Standard Dev	Mean	Standard Dev	Mean	Standard Dev			
Mark up	Positive	\$ 0.4213	\$ 0.3090	Positive	\$ 2.5387	\$ 1.1033	Positive	\$ 5.9770	\$ 1.4746
	Negative	\$ (0.9444)	\$ 1.0458	Negative	\$ (0.7733)	\$ 0.7023	Negative	\$ -	\$ -
	Overall	\$ 0.4213	\$ 0.3090	Overall	\$ 2.3566	\$ 1.3219	Overall	\$ 5.9770	\$ 1.4746
20%	Mean	Standard Dev	Mean	Standard Dev	Mean	Standard Dev			
Mark up	Positive	\$ 0.6442	\$ 0.4317	Positive	\$ 3.5721	\$ 1.2491	Positive	\$ 7.6393	\$ 1.5391
	Negative	\$ (0.9569)	\$ 0.7710	Negative	\$ (0.9531)	\$ 0.6433	Negative	\$ -	\$ -
	Overall	\$ (0.2765)	\$ 1.0236	Overall	\$ 3.5449	\$ 1.2943	Overall	\$ 7.6393	\$ 1.5391
30%	Mean	Standard Dev	Mean	Standard Dev	Mean	Standard Dev			
Mark up	Positive	\$ 0.9597	\$ 0.6234	Positive	\$ 4.5242	\$ 1.2731	Positive	\$ 9.1793	\$ 1.6054
	Negative	\$ (0.8125)	\$ 0.7642	Negative	\$ (0.1326)	\$ 0.0485	Negative	\$ -	\$ -
	Overall	\$ 0.3997	\$ 1.0627	Overall	\$ 4.5149	\$ 1.2888	Overall	\$ 9.1793	\$ 1.6054

## Appendix D: 10-year Growth Plans (Low, Medium, and High)

Year	Low-Growth	Medium-Growth	High-Growth
<b>1</b>	51 policies	51 policies	51 policies
<b>2</b>	51 policies (0% Growth)	61 policies (20% Growth)	64 policies (25% Growth)
<b>3</b>	51 policies (0% Growth)	74 policies (20% Growth)	80 policies (25% Growth)
<b>4</b>	56 policies (10% Growth)	88 policies (15% Growth)	103 policies (30% Growth)
<b>5</b>	61 policies (10% Growth)	101 policies (15% Growth)	129 policies (20% Growth)
<b>6</b>	68 policies (10% Growth)	117 policies (15% Growth)	154 policies (20% Growth)
<b>7</b>	75 policies (10% Growth)	128 policies (10% Growth)	185 policies (20% Growth)
<b>8</b>	86 policies (15% Growth)	141 policies (10% Growth)	213 policies (15% Growth)
<b>9</b>	99 policies (15% Growth)	155 policies (10% Growth)	246 policies (15% Growth)
<b>10</b>	114 policies (15% Growth)	170 policies (10% Growth)	282 policies (15% Growth)

## Appendix E: Annual Expenses & Startup Costs

Operating Costs		Sources	Startup Costs		Sources
EMPLOYEE BENEFITS			Chairs (6)	\$ 420.00	Staples
Underwriter Salary	\$ 50,622.00	PayScale.com	Desks (6)	\$ 1,199.94	Staples
Customer Service Salary	\$ 29,723.20	PayScale.com	Laptops (6)	\$ 1,499.94	DELL
Secretary Salary	\$ 24,960.00	PayScale.com	Phones (6)	\$ 365.94	Staples
Actuary Salary	\$ 79,583.00	PayScale.com	Refridgerator (1)	\$ 499.99	Sears
Claims Examiner Salary	\$ 48,782.00	PayScale.com	Microwave (1)	\$ 67.00	Walmart
Auditors Salary	\$ 51,533.00	PayScale.com	Printer (1)	\$ 475.00	DigitalSystemCopiers.com
Employee Health Insurance	\$ 27,672.00	KFF.org	Filing Drawers	\$ 249.00	Ikea
OFFICE RELATED			Legal Costs	\$ 6,000.00	LexisNexis
Rent	\$ 17,700.00	CraigsList	Employee Training	\$ 24,000.00	Entrepreneur.com
Water	\$ 240.00	ohmyapt.apartment.com	Licenses/Permits	\$ 4,040.00	MassGovernment
Electricity/Gas	\$ 1,140.00	ohmyapt.apartment.com	Deposited Rent	\$ 1,475.00	One Months Rent
Internet/Telephone/Cable	\$ 1,080.00	Charter	SAS (1)	\$ 8,700.00	SAS
Office Supplies	\$ 228.00	SmallBusiness.com	Database Server	\$ 879.00	DELL
Accounting Software	\$ 2,700.00		Docking Stations (6)	\$ 1,020.00	DELL
Microsoft Office (6)	\$ 224.95	MicroSoft Office			
MARKETING					
Advertising	\$ 1,960.00	MassGovernment	<b>TOTAL STARTUP</b>	\$ 50,890.81	
<b>TOTAL OPERATING</b>	\$ 338,148.15				