Insurance Solutions

# QUANTIFYING HEALTHCARE INDUSTRY ADVERSE DISRUPTORS

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# Executive Summary

Health Care Corp. is currently interested in the potential disruptors that will have a negative impact on its financial bottom line within the next five years. To address this issue, several important factors in the health insurance industry are considered: drug price fluctuations (existing drugs and new drugs), pandemics, and mergers and acquisitions (M&A) in the healthcare sector. To further understand the potential of the aforementioned disruptors, regulations – as well as the current US presidential elections – are taken into account.

Health Care Corp. is recommended to follow the below strategies to address the potential disruptors in the industry:

➢ To deal with price surges of existing drugs, an annual inflation rate of 4.07% should be applied to the model for prescription drugs, and coverage limits for drug plans should be implemented if not already done so.

➢ For newly developed drugs, excess-of-loss reinsurance should be purchased as well as diversifying the portfolio of policyholders towards a younger demographic.

➢ To address the potential impact of pandemics, Health Care Corp. is advised to issue catastrophe bonds to seek protection from the capital markets on a reinsurance basis against a sudden and/or sharp rise in medical benefit claims.

➢ To adapt to the M&A environment in the current industry, the company is advised to revise its capital structure as well as to explore potential merger partners.

Due to the cyclical nature in growth of prescription drug spending, a sudden increase fueled by drug patents will bring severe losses to the company. The effect could be further exacerbated if regulations in the next five years favor a curbing of deductibles and co-payments. A more organic risk hedging, such as diversifying the portfolio of policyholders, is advised in such case.

Our analysis has pointed out that a pandemic, even in a moderate scenario, will have an extremely detrimental financial impact. In order to address the risks associated with such events, Health Care Corp. is advised to transfer part of the pandemic risks to a third party. Seeking reinsurance appears to be an obvious choice to mitigate the aforementioned risks, however, a reinsurance treaty specifically for pandemics is also unlikely to be available, or could be quite

expensive with limited protection.  Health Care Corp. should consider risk transfer through the insurance linked security (ILS) market, potentially through the use of catastrophe bonds or collateralized reinsurance to protect against events such as pandemics.

In order to remain competitive and profitable in the consolidating healthcare industry, Health Care Corp. is advised to not only keep generating its current operating revenue and a healthy stream of free cash flows, but more importantly to review its corporate structure. Health Care Corp. is also advised to further explore potential merger partners that will provide it with a growing network of healthcare providers, as well as an opportunity for growth in the next five years.

## 1.0 Purpose and Background

In recent years, the US health care industry has been under constant pressure from the pharmaceutical industry, the financial environment, and the lurking presence of a health care catastrophes such as a pandemic. Each of these forces vies to be a health insurance company's priority in order to prevent their crippling financial impacts. The purpose of the following analysis is to look at the impact of the amalgamation of each of the disruptive forces mentioned, especially the interaction of them with each other and the overall impact on claims and costs to the company. An overview of each disruptor is first provided for a better context into our analysis.

## 2.0 Pharmaceuticals

Towards the end of 2015, drug price hikes in the U.S. drew a lot of media and political attention. Turing Pharmaceuticals became the center of controversy by raising the price of Daraprim from $13.50 a tablet to $750 after acquiring exclusive right through FDA (Food and Drug Administration) (El Akkad, 2015). Valeant increased the prices of 55 drugs in 2015 with an average increase of 65.6% (Helfand, 2015). While pharmaceutical companies justify their price hikes with high research and development cost, consumers, insurance companies, and the government bears the burden of the impact.

## 2.1 Current Drugs

Current drugs' price increases are chosen as a disruptor because of the potential high costs. Although most prices tend to be stable, some prices jumps have been unpredictably large, and the combined effect of many price hikes could be damaging to the company. Therefore, we built a model to analyze historical results and forecast future experience. To calculate exact financial results, the calculations are modeled on a medium sized health insurer: Coventry Healthcare before being acquired in 2013 (SEC, 2013). The following subsections discuss our approach regarding data and methodology before results are presented.

### 2.1.1 Data and Assumptions

The data selection process was conducted based on three criteria: complexity, comprehensiveness, and cost. Several different complementary sources were first considered, including the CMS (Centers for Medicare & Medicaid Services), the FDA (Food and Drug Administration), and various private databases. After preliminary exploration of each source, two challenges emerged in most of the considered sources. The first obstacle encountered was that a lot of databases were incomplete; either the data documented too few drugs' prices or had too many missing values. Sources were also eliminated because of their monetary costs. It was finally decided to take the CMS data on drugs covered by Medicaid. The source had the most comprehensive data and was well maintained and updated.

The data was taken from the weekly price comparisons in the Medicaid formulary over the past two years. Every week, a new file is uploaded for price changes as well as for new additions of covered drugs. Information in the data includes the NDC (National Drug Code) description of the drug, its NDC, the drug price at the beginning of the week, the price at the end of the week, the classification for rate setting, the percent change in price, and the primary reason for the price change. The prices given are calculated on a National Average Drug Acquisition Cost (NADAC) basis.

As part of the data validation process, closer inspection was given to the source of the provided data and the definition of each variable. The source of the prices, NADAC, was first scrutinized. Careful reading of the "Methodology for Calculating the National Drug Acquisition Cost (NADAC) for Medicaid Covered Outpatient Drugs" (CMS, n.d.) was made to validate our

chosen data. The document outlines Medicaid's methodology in establishing NADAC, which we judged to be satisfactory for the purpose of our analysis. One observation to note is that Medicaid does not publish retail prices but prices for which pharmaceutical companies sell to wholesalers and pharmacies. Thus, the prices in the data are lower than would be available to consumers. In our analysis, we make the assumption that there is a constant markup over time. With this assumption, the data can be used as a proxy for modelling drug prices. Another observation is that there could be different reasons for NADAC Per Unit Change. We chose to only consider changes in published pricing ("WAC Adjustment") as it is an official price change.

After confirming the validity of the data, further formatting was performed to prepare it for modelling. First, we consolidated the data from every weekly file into a single file. A VBA (Visual Basic Application) code was developed to extract and consolidate the drug prices (see "VBA code.pdf"). As mentioned, since the prices only appear if there has been a change, this step brings down the number of rows to about 6000. The next step in preparing the data for modelling was to remove duplicates; if every value on a row was the same as another row except for the NDC, which could happen due to differences in packaging, then the row was removed to avoid double counting the price change.

### 2.1.2 Methods, Analysis and Models

The method chosen to model price changes over time is to look at empirical data and to forecast frequency and severity for the price changes. The final result will be an inflation rate for drug prices based on the combined effect of frequency and severity.

A few assumptions have been made to transform our data into coherent results. First, we assume that the drugs covered by the company for all policies are the same drugs that are covered by Medicare and Medicaid. This is a fair assumption as a significant proportion of our health insurance company's policies originate from Medicare and Medicaid programs already (SEC, 2013). Moreover, no coverage limits are yet taken into account in this analysis in order to let the raw impact be reflected. The third assumption is that all drug claims are made on a weekly basis to be consistent with the frequency of our data. The next few assumptions pertain to the sampling procedure, which will be explained in the next paragraph, used in the severity modelling. A judgement assumption was made about the market share of a drug used to treat a

certain disease. Once a drug was randomly selected to be in the sample, it was assumed that it would have a 10% market share for treating the disease it was created for. Concerning the frequency and length a policyholder would have to take the drug for a disease, if no information was found, it was assumed drug takers would only buy one package today for treatment. As well, if the drug was to be taken for many years, the assumption would be that the drug will need to be taken continuously for the first five years. The costs of a drug that needs to be taken over many years would be discounted at a 1.5% effective interest rate. The present Federal Reserve System (FED) interest rate is between 25 basis points and 50 basis points. However, as the US economy is expected to grow (Trading Economics, 2016), inflation is expected to increase as well, and interest rates should follow. Thus, a 1.5% interest rate is assumed.

Creating a severity model from the data involved analyzing the NADAC empirically by percentage. A histogram was created to visualize the distribution (see Appendix A). However, since the frequency and length of time a drug needs to be taken vary greatly, knowing the percentage increases was insufficient. Further research would need to be done to better quantify the dollar impact of the price variations. Since no database was readily available, a sample was created to approximate the entire data. The sample was chosen based on intervals of percentage increase. A total of 20 drugs were selected. They were picked from each interval based on the number of drugs present in each interval and the sampling used simple random sampling without replacement. A number between 0 and 1 was randomly generated for each drug in the data. The drugs whose random numbers were the closest to 0.5, without being greater than 0.5, were chosen to be in the sample.

The frequency and length of time a drug needed to be taken were researched for each of those 20 drugs and used to arrive at a dollar value impact on cost for the company. The calculation of the dollar amount impacts used the following simple formulae:

1. $Impact\ per\ week$

$$= Dose\ per\ week \times Current\ unit\ retail\ price \times \frac{\%\ price\ increase}{1 + \%\ price\ increase}$$

2. $Present\ value\ (PV)\ of\ impact = Impact\ per\ week \times \ddot{a}_{\overline{n}|i}$

where $n = Duration\ of\ treatment\ in\ weeks,\ i = interest\ rate\ assumed$

3. $Total\ impact$
$$= PV\ of\ impact \times Prevalence\ rate\ \times \#\ of\ policyholders$$
$$\times Market\ share\ assumed$$

Cumulative percentage changes are also computed to examine the effect of multiple drug price changes over the years. To arrive at an annualized percentage increase, percentage increases of drugs (characterized by their NDC) were compounded over every week. After arriving at a cumulative rate of increase, it was then annualized.

The frequency of price increases was found by analyzing the number of increases per week. A histogram of the number of price increases per week can be found in Appendix A.

Model validation was performed using by comparing our results to the historical price index of pharmaceuticals in the US (Kaiser Family Foundation, n.d.). We saw that the result derived from our model approximates the price index from 2009 to 2014 (apart from 2013).

There are multiple factors that could influence our final results, including demographic and social shifts, pandemics, and technological advances. Among demographic shifts, an aging population will change the age distribution and increase prevalence rates of certain illnesses which affect an older population disproportionately (Centers for Disease Control and Prevention, 2003) On the other hand, social trends such as the advent of wearable technology that encourage people to eat healthier and exercise adequately could lower prevalence rates (PwC, 2014) and dampen exposures to drug price increases. Finally, pandemics, although rare, will completely change the established prevalence and exposure in the market.

### 2.1.3 Results, conclusions and discussions

We found that the average cost of an increase of drug price for the company is $12,628,420, which represents 0.39% of total annual premiums and 9.33% of the net income in 2013. An average percentage was also calculated by giving weight to increases that had a higher financial impact. Each weight is equal to the cost of an individual drug in the sample over the total cost of the sample. The cost-weighted average percentage increase is 9.88%.

For frequency, the average number of drug price increases per week is 56, and a 95% confidence interval is [37, 75]. Dividing by the total number of drugs, the average probability of a drug price increase is 0.01.

Combining frequency and severity, the expected weekly inflation is 0.08%, which becomes 4.07% when annualized. A 95% confidence interval is [1.78%, 6.36%].

With the raw data of price increases, we calculated an average percentage increase in price, given an increase, of 11.85%, which is close to the cost-weighted average found with the sample. Some quantile statistics shows that 79% of price increases are lower than 10%, and 97.5% of them are lower than 36.56%. Hence, small increases dominate the distribution, and large price rises are rare.

Furthermore, by analyzing a couple of the largest percentage price increases with the same model, we observed a maximum impact of $2.2 billion, or 1625% of net income. If the company's drug plans stipulate deductibles, policy limits, or exclusions for this drug, then this result is an overestimation of the real impact. Hence, to avoid such large losses, it is important to have measures that limit losses in place. In general, certain situations at risk of causing large losses are:

- Pharmaceutical companies that own patents or have monopoly over certain drugs, especially companies in financial distress or in need of funding
- Drugs for long-term illnesses (since the increase is reflected over many years).
- Drugs for prevalent illnesses (since more people need to consume these drugs).
- Drug that cost more per unit

The conclusion of the analysis of drug price increases can be separated into two categories: average increases and large increases. For average increases, the results show that most drug prices are stable. If there are increases, they tend to be frequent and of low impact. However, for large price increases, the frequency is extremely low, but the impact can be very severe.

We forecast that the situation in the next five years will be similar to the experience in the last two years, but of course, new legislations may revolutionize the pharmaceutical market and

the health insurance sector. Competition may be a key factor. Based on recent high profile cases of large hikes in drug prices such as with Turing Pharmaceuticals and Valeant Pharmaceuticals International, large drug increases are likely to become even less frequent due to the effects of bad publicity. Thus, it would be more likely that future drug prices increase more frequently and smoothly.

Based on our conclusions, we have the following recommendations. First, we suggest the client to increase overall reserves to account for inflation in drug prices in the next five years. It would need to take its own data for drug claims and input it into our model to find a factor which will be applied in its model for pharmaceuticals. This factor will adequately hedge against forecasted claim increases. Using the company's data will remove assumptions made in order to build our model, such as the market share of a drug. Secondly, the client should implement large loss prevention measures such as reinsurance or policy limits if it has not already done so. Reviewing the coverage limits of drug plans can also be helpful.

Some outstanding issues with the model include the lack of readily available databases that contain all the information we need and the difficulty in accounting for new drugs entering the market. The lack of data on retail prices and quantity of claims per drug means that time-consuming research needs to be done to find the information externally.

## 2.2 New Drugs

Drugs newly introduced to the US market have a great impact on overall drug spending. However, this impact is difficult to quantify as the data related to new drugs is very fragmented and not readily available. A qualitative analysis follows to introduce the issue that new drugs represent on US health care spending.

To be approved for coverage by Medicare/Medicaid, or any other health insurance plan, in the US, a drug first needs to receive FDA approval to certify that it is safe for use or consumption. This crucial step can take years before the results from clinical trials are evaluated and safety standards are confirmed. The cumulative waiting time before a new drug, even a breakthrough one, penetrates the market and becomes established can be significant. This waiting time is non-negligible since drugs in the US have a patent expiry length of 20 years after the patent application, not of the FDA approval, which means that the effective length of a drug

patent usually ranges from 7 to 12 years (Mandal, 2014). After the expiry of the patent for a drug, the formula for the drug becomes publicly available and other pharmaceutical companies can create a generic version of it. Another company can also renew the exclusivity of the drug and appropriate it for itself. From the consumer's perspective, patented brand name drugs are usually some of the most expensive drugs sold at pharmacies. Thus, to sum up the overview, a slew of regulatory and market forces dictates the prices of drugs and the costs to the health insurers.

### 2.2.1 Analysis of New Drugs entering the Market

This section will expand on the overview of getting a drug approved and covered and its impact to health insurers' costs. A look at the Kaiser Family Foundation analysis of what drives the growth in drug spending in the US (Figure 1) will indicate that it is primarily new drugs entering the market that increase overall prices year over year. This effect is primarily due to the presence of patents which prevent competition from other companies. However, since the effective patent length of a drug is about 7 to 12 years, a batch of drugs patents expiring at the time could create a decrease in spending, as was the case for the 2010 to 2013 period as seen in Figure 2 (Kaiser Family Foundation).
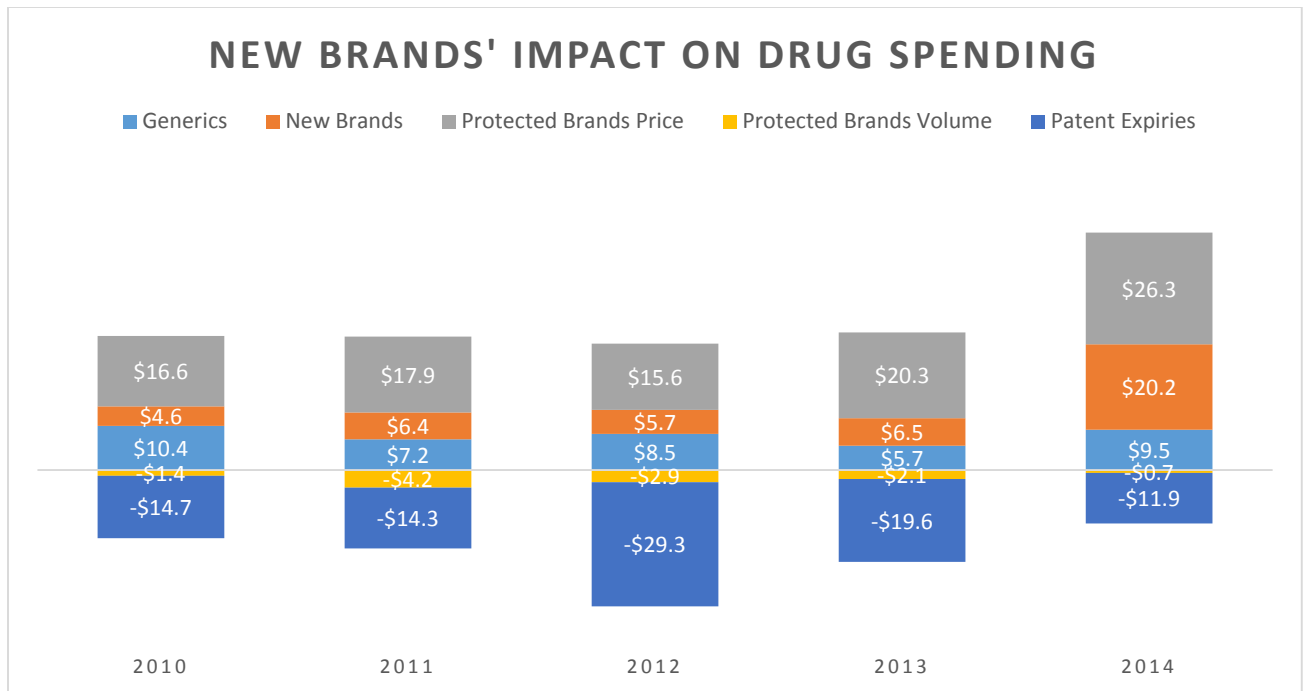
## NEW BRANDS' IMPACT ON DRUG SPENDING

Legend: ■ Generics ■ New Brands ■ Protected Brands Price ■ Protected Brands Volume ■ Patent Expiries

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Protected Brands Price | $16.6 | $17.9 | $15.6 | $20.3 | $26.3 |
| New Brands | $4.6 | $6.4 | $5.7 | $6.5 | $20.2 |
| Generics | $10.4 | $7.2 | $8.5 | $5.7 | $9.5 |
| Protected Brands Volume | -$1.4 | -$4.2 | -$2.9 | -$2.1 | -$0.7 |
| Patent Expiries | -$14.7 | -$14.3 | -$29.3 | -$19.6 | -$11.9 |

**Figure 1**

## PRESCRIPTION DRUG SPENDING GROWTH

Legend: ■ Prescription (Actual)

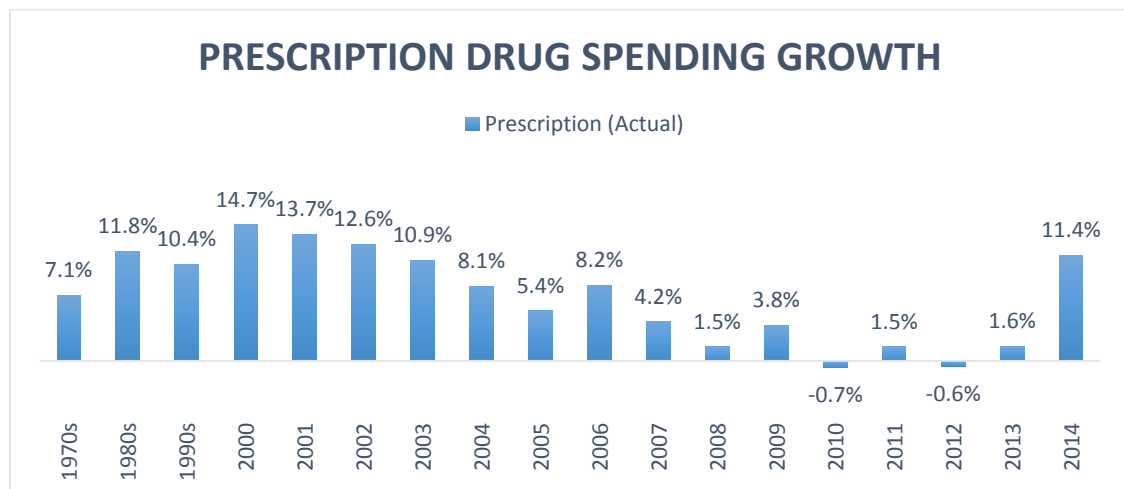| Year | Value |
|---|---|
| 1970s | 7.1% |
| 1980s | 11.8% |
| 1990s | 10.4% |
| 2000 | 14.7% |
| 2001 | 13.7% |
| 2002 | 12.6% |
| 2003 | 10.9% |
| 2004 | 8.1% |
| 2005 | 5.4% |
| 2006 | 8.2% |
| 2007 | 4.2% |
| 2008 | 1.5% |
| 2009 | 3.8% |
| 2010 | -0.7% |
| 2011 | 1.5% |
| 2012 | -0.6% |
| 2013 | 1.6% |
| 2014 | 11.4% |

**Figure 2**

From Figure 2, we can see that growth in drug spending seems to behave in a cyclical fashion. This trend is likely due to the advent and expiry of important patents as was the case for

the dip in growth in the early 2010s. Thus, another spike or trough in drug spending in the next 5 years can be reasonably expected.

# 3.0 Pandemics

Pandemics have always impacted the health insurance industry, as they lead to unusually high number of deaths and disability.  In the 1918 flu pandemic, also known as the Spanish flu, approximately 20%-40% of the global population were infected, resulting in 50 million deaths. In the 1957 flu in the United States, 69 thousand people died. In the 2009 H1N1 flu, an estimated 43 million to 89 million people were infected globally (Pandemic Flu History, 2016).

With more recent pandemics such as Ebola, Zika Virus and H1N1, coupled with the huge healthcare costs that pandemics can bring, it is definitely of interest to further investigate the impact of pandemics on health insurance.

## 3.1 Data and Assumptions

The data used in this section, along with the Excel model, is adapted from the SOA (2010) study on potential impact of pandemics on health insurance. Changes are made to the existing SOA Excel calculator to give exact financial results. (See attached *Pandemic_Tool.xlsx* for more details) Several key assumptions used by SOA in the 2009 study are updated with more current US population data.

To calculate exact financial results, the calculations are modelled on a medium sized health insurer (Coventry Healthcare before being acquired in 2013). The impact of pandemics are then projected onto the top two most popular health plans offered by the company. The details of Coventry Healthcare used in this part of the analysis are as follows:

- 4.81% market share
- 5.172 million (M) members (1.4M in top health plan, 778 thousand in second health plan)
- $3.24 billion (B) in premiums collected (2013)

Mortality/hospitalization data from the 2009 H1N1 influenza was also used and interpolated between different ages uniformly.(Centers for Disease Control and Prevention, 2009)

## 3.2 Methods, Analysis and Models

Given the common occurrence of flu every year, the pandemic scenarios that are used will be based on previous flu cases. To estimate severity and impact, we looked at three different scenarios and three different distributions. To gain a perspective of the mortality and financial impact of a pandemic, scenarios examined includes the catastrophic Spanish flu, as well as a typical flu season.

The three scenarios are as follows:
- 1918 Spanish Flu (Severe)
- 1957 Flu (Moderate)
- Seasonal Influenza (Seasonal)

For each scenario listed above, there are specific mortality, morbidity as well as distribution (distribution of cases between hospitalization, deaths, and outpatient visits) assumptions.

The three distributions are as follows:
- 'W' → 1918 Flu
- 'S' → Seasonal Flu
- 'V' → Interpolation between seasonal and 1918 flu

Each distribution scales the mortality and morbidity rate from the three scenarios. The "W" distribution implies that there is a spike in mortality and morbidity in young, middle as well as older ages like the letter "W". The "S" distribution scales mortality/morbidity based on a typical flu season. To better update the data used by the SOA, mortality and infection rates are taken from the 2009 H1N1 influenza and then applied to different scenarios/distributions through the different costs assumptions applied.

## 3.3 Results and Limitations

| Scenario/Distribution | S | V | W |
|---|---|---|---|
| Seasonal | 37% | 134% | 162% |
| Moderate | 122% | 452% | 547% |
| Severe | 126% | 477% | 576% |

**Table 1:  Costs of pandemic as % of Net Income(Coventry Healthcare, 2013Q1)**

As shown in table above, with a catastrophic pandemic such as the Spanish flu, the company will be heavily affected. Even in a moderate scenario, the company will still be heavily impacted by the pandemic. As a result, we must attempt to transfer this risk to a third party. For added context, one can see that, in a typical seasonal influenza, a health insurer is expected to face 37% excess costs, and in simply a moderate scenario, with a seasonal distribution, the company is expected to face 3 times the costs of a typical influenza.

However, it must be noted that the financial impact illustrated above is limited to only top two health plans, which is only 40% of the total members of the company, due to the structure of the existing SOA tool. It can be safely assumed that the results projected above serve as a more conservative estimation of the potential impact of pandemics.

## 3.4 Recommendations

To transfer part of its pandemic risk to a third-party, the obvious choice appears to be a reinsurance treaty. However, as a reinsurance policy for such tail risks may not be available or could be very expensive with limited protections, the client should consider the usage of the capital markets and transfer risks efficiently to insurance-linked security (ILS) market and collateralized reinsurance capacity. ILS has been a popular tool used by a growing number of insurers and reinsurers who buy collateralized protection against losses on peak risks from capital markets rather than the traditional reinsurance market. Sponsors of ILS include large insurance and reinsurance companies, government entities with concentrated and large exposure to tail risks, such as natural disasters, extreme mortalities and other insurance related risks.

# 4.0 M&A Activities

According to Forbes, in the year of 2015, mergers and acquisitions across all industries globally totaled almost $5 trillion, once again reached its highest volume in history (Peterson, n.d.). Being the second largest driver after the financial sector, the healthcare sector announced 17767 transactions with total transaction sizes exceeding $661 billion. In the U.S., the five largest health insurers in 2014 occupied over 80% of the of the market shares, and the recent deals in the past year, Anthem's acquisition of Cigna and Aetna's acquisition of Humana, would combine the largest five firms into three (B. V., & A. W. (2015). Health Care Consolidation).

## 4.1 Activity Drivers and Trends

The healthcare industry continues to evolve to follow the rapid M&A activities in the broader markets and to adapt to the impact by the Affordable Care Act. According to the KPMG's 2016 M&A Outlook survey (2016), more than half of the surveyed industry professionals believed that the "industry's response to Affordable Care Act, including scale advantages" would further drive the M&A activities in 2016 in the healthcare sector. The healthcare M&A boom is not a one-sided phenomenon: both healthcare providers such as insurers and healthcare payers such as hospitals, physician groups, and pharmaceutical companies are reaching its highest deal volume.

The trend has been clear to see: as providers are bolstering their pipelines and growing in sizes, payers have been pushed by the consolidation trend and left with no other choices but growing larger with broader coverage in order to compete for bigger networks and more negotiating leverage. It is true that in order to survive in this competitive industry, companies need to "be part of a larger, successful, horizontally and vertically integrated organization", according to the CEO of Ingalls, a relatively small player in the industry with only one hospital, which decided to seek for a merger partner and join the market trend after finding its low profit margin (only about half) compared to larger companies (Mathews, 2015).

In the next five years, there is a chance that the market will witness more large-size marriage such as Pfizer/Allergan merger ($148.6 billion) and Anthem/Cigna merger ($51.9 billion) (S&P Capital IQ). In additions, the Affordable Care Act and any potential changes to its provision that might be carried out by the coming 2016 Presidential Election result would impact the healthcare industry, affecting players of all sizes. In the first quarter of 2016, in terms of deal proceeds, healthcare stands as the leading sector for US M&A with over $65 billion in announcements, indicating a bright start for the rest of the year as seen in Figure 7 (Peterson, R. 2016).  It is expected that notable M&A continues to happen in the next five years, with attention being paid mostly on insurers. In the middle markets, dealmakers will continue to expect the number of transaction and deal sizes to increase.

| Deal Proceeds | $mm |
|---|---|
| Energy | 31289.8 |
| Materials | 16341.4 |
| Industrials | 32186.7 |
| Consumer Discretionary | 43360.8 |
| Consumer Staples | 3550.9 |
| Healthcare | 65046.0 |
| Financials | 43309.3 |
| Information Technology | 27870.3 |
| Telecommunication Services | 1852.1 |
| Utilities | 25317.7 |
| No Primary Industry Assigned | 3061.2 |

**Figure 7. 2016 Q1 M&A Deal Announcements in terms of Proceeds (Peterson, R. 2016)**

## 4.2 Recommendations

To be able to fit in the consolidating industry and maintain a high profitability, besides keep generating its current operating revenue and a healthy stream of free cash flows, the client company is recommended to carefully review its capital structure, including its leverage ratios and other key performance indicators, and its corporate structure. The client is advised to consider potential merger partners with companies that provide complementary platforms and possible takeover opportunities as a part of their operating strategies given the five-year outlook. This will not only avoid the concern of being cut out as a small insurer with limited networks but also help the client company grow both organically and inorganically.

# 5.0 Regulations and Election Scenarios

All the disruptors discussed in the previous sections do not address the possibility of new regulations due to presidential change. Indeed, the US elections will bring massive changes to the health insurance industry no matter which party wins. A republican win would most likely bring enormous pressure on the ACA's (Affordable Care Act) existence (Edgar, 2016). Should this happen, health insurers will need to decide if they keep insuring the policies that were created by the ACA or abandon them at renewal. On the other hand, a win for the Democratic Party would usher in new regulations to curb out-of-pocket spending for the consumer as well as an expansion of the ACA's coverage eligibility. In particular, the official platforms of both democratic frontrunners, Hillary Clinton and Bernie Sanders, include plans to lower drug prices for consumers (Edgar, 2016). There are already discussions on curbing drug prices by expediting FDA approval for generic drugs which would compete with pricier brand name drugs (Edney, 2016). Curbing drug prices would only intensify under a Hillary Clinton administration. In the event of a Bernie Sanders presidential win, even more drastic changes would occur as he has run on a platform of introducing a universal health care system to the US (Edgar, 2016).

## 5.1 Recommendations

To summarize, the risks faced by US health insurers from new drugs entering the market and from regulations can have broad impacts on claims costs which stem from sudden and scenario dependent events. For new drugs, the risks come from a spike in drug spending sustained by patents and the absence of competing drugs. To counter this possible event, the company would be advised to purchase excess-of-loss reinsurance to hedge on unexpected and severe growth in drug spending. The effect of increased drug spending could also be amplified by the election of a democratic candidate. The regulations following such an event would restrict traditional methods of handling an increase in claims such as increasing the deductible amount or co-payments. This outcome is because there would be a focus on limiting expenses for the consumers. In such an event, a recommendation would be to try to expand the proportion of young people insured. This would improve the loss ratios as young people tend to be healthier and require less health care. Targeting and insuring a younger demographic would thus be an organic way to share risk and balance premiums and costs without the utilization of deductibles and co-payments.

## 6.0 Conclusion

In this increasingly changing environment for health insurers, companies must prepare for potential disruptors that will change the competitive landscape of the industry. We believe that by adapting our recommendations into the financial and operational decisions, Health Care Corp. will be able to sufficiently handle any unpredictability in the next five years from both an actuarial and strategic standpoint.

To summarize, Health Care Corp. will be able to address the issue of severe drug price surges through leveraging excess-of-loss-reinsurance; a drug price inflation rate of 4.07% should also be adapted into the current actuarial assumptions to account for this issue. In terms of pandemics, the use of the ILS market would enable Health Care Corp. to mitigate this risk. The client is also advised to pursue M&A opportunities to better position themselves in a strategically advantageous position to continue expanding in the industry.

In addition to the preceding recommendations, Health Care Corp. could also benefit from the following suggestions. Increases in drug prices can be accurately modelled with existing client data that will give a better picture of the specific drug price increases that are of issue. In terms of pandemics, the client would benefit from the use of stochastic models to more suitably capture the randomness of such events. Software such as GGY AXIS and Atlas could be considered.

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# Appendix A – Additional Results on Pharmaceuticals

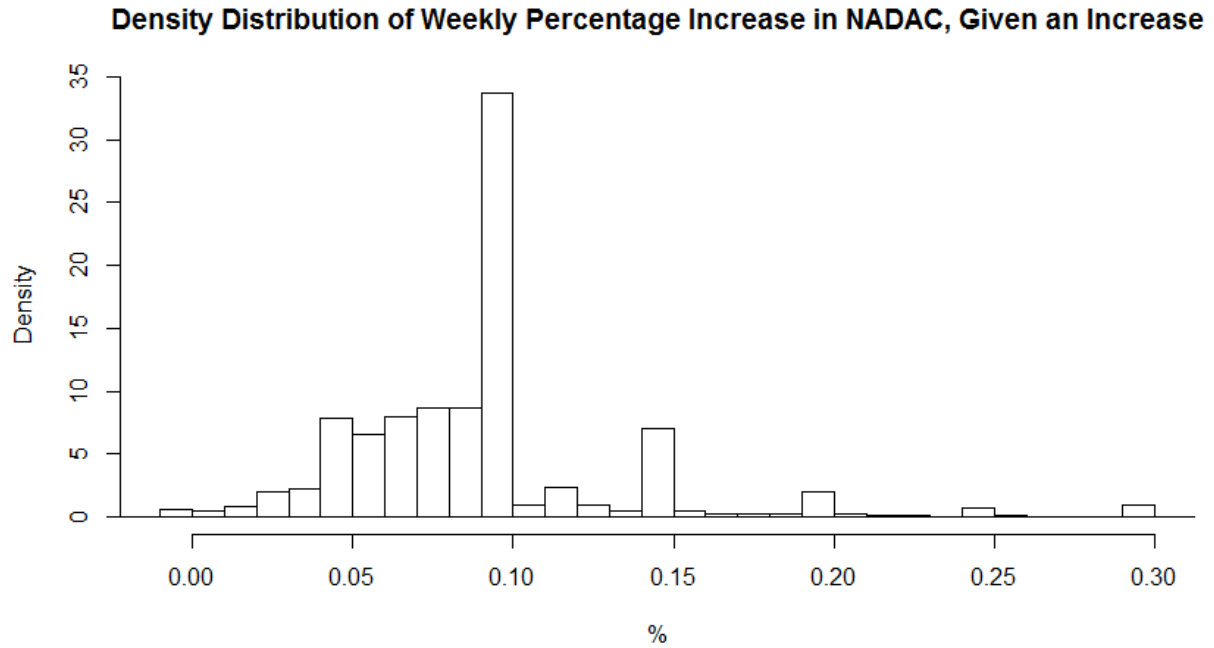Figure 3.  Distribution of Weekly Percentage Drug Price Increases
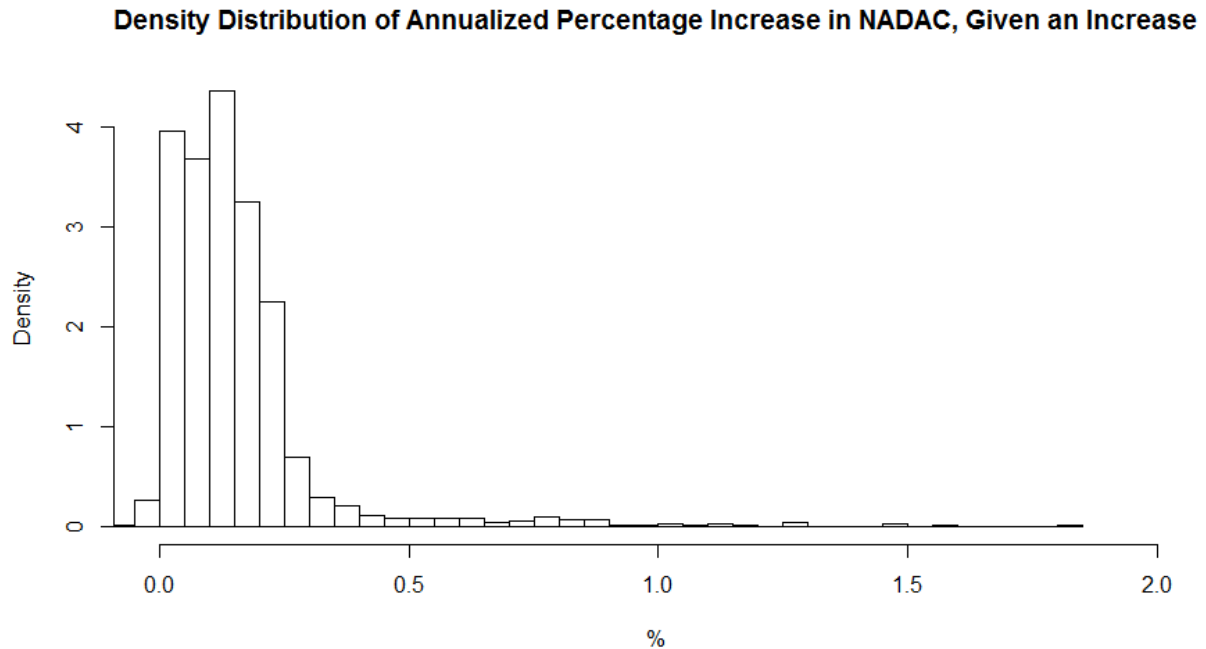
**Density Distribution of Weekly Percentage Increase in NADAC, Given an Increase**

Figure 4. Distribution of Annualized Percentage Drug Price Increases

**Density Distribution of Annualized Percentage Increase in NADAC, Given an Increase**

Figure 5. Distribution of the Frequency of Drug Price Increases per Week
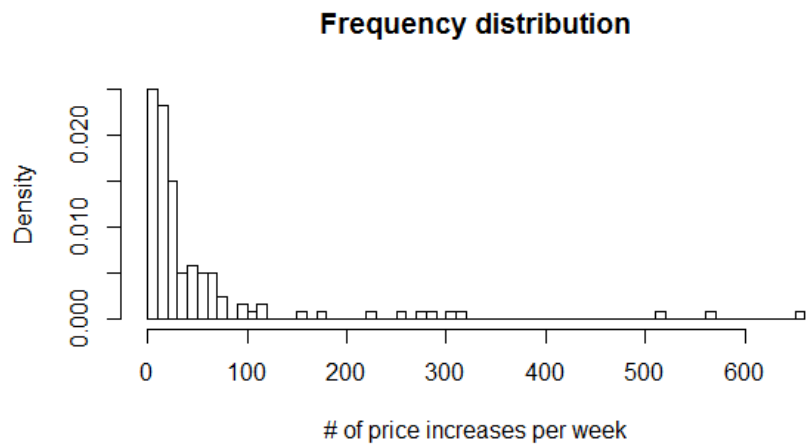
**Frequency distribution**



Figure 6. Distribution of Total Impacts Based on Sample

**Dollar impacts of a sample of drug price increases**