Impact of the Affordable Care Act on the Net Income of UnitedHealth Group, Anthem Inc., and Centene Corp.

Paul Jaworski, West Chester University

I.   Introduction

During the Obama Administration, the ACA was implemented. Since then, the decision about whether to repeal or leave the Act intact has been widely debated. Prior to implementation, the uninsured rate of the United States was hovering around 16 percent, while other first world nations had nearly no uninsured citizens (Kaiser Family Foundation, 2017; Ellis, Chen, and Luscombe, 2016). After implementation, the United States' uninsured rate fell to 10 percent, indicating a benefit to the collective population. Although a 6 percent point change is substantial, the largest age group to adopt insurance due to the ACA is low risk, 20- to 35-year olds (Barnett and Vornovitsky 2016). The new health care law prohibits health discrimination against individuals with preexisting conditions. For example, if an individual has cancer, the health insurer cannot drop the individual's coverage. Additionally, large companies cannot select healthy individuals out of the health insurance pool, or pick those seeking insurance who have low risks of getting sick. The Act also provides subsidies to purchase health insurance. Furthermore, the Act limits the percentage of premiums that the insurers can use for profits. The debate on whether the ACA should be repealed or not largely rests on the controversy of forcing individuals to have health insurance.

The ACA provisions received a mixed reception from insurance companies. For example, both Anthem Inc. and Centene Corp. have embraced the ACA, while UnitedHealth Group does not support the Act. Anthem Inc. and Centene Corp. provide insurance for individuals affected by the ACA, whereas UnitedHealth Group has stopped supplying insurance to individuals under the ACA due to financial distress caused by the Act (Howell, 2016; Nisen, 2017; Hall and McCue, 2016). Prior to any repeal, one must analyze how the ACA affects the healthcare insurance industry. This article uses regression analysis to show how the ACA impacted three insurance companies: UnitedHealth Group, Anthem Inc., and Centene Corp.

II.   Literature Review

Prior to the implementation of the ACA, statistician Richard Foster from the Office of the Actuary projected the potential impact of the health law on individuals receiving healthcare. He also estimated the costs and profits of health care, including Medicare, Medicaid, and insurance companies. Foster discussed the projected growth in healthcare after the enactment of the ACA. According to Foster, there would be a 0.9 annual percent increase in health expenditures during 2010-2019 (Foster 2010). He projected more demand that would lead to price increases to healthcare providers, and ultimately more expenses due to patients with low reimbursement health coverage. He also stated that a large cost would accrue to the government. Now that years have gone by since this research, we will be able to see if it accurately projected the cost allocations and how the ACA impacted health insurance companies.

Researchers Blumberg, Buettgens, Feder, and Holahan analyzed the impact of the ACA on employers of various size. They subcategorized their study by firm size and examined the employer spending on healthcare before and after the ACA. Contrary to Foster's projections, they found that much of the expenses initially allocated to the government's expenses were being placed on employers. They gathered time-series data depicting the costs and profit changes to employers of different sizes. Through their analysis, they found expenses increased by 6.3 percent for small firms (less than 100 employees), 4.6 percent for mid-sized firms (101-1,000 employees), and 3.9 percent for large firms (greater than 1,000 employees) (Blumberg, Buettgens, Feder, and Holahan 2012). The wide variation was primarily attributable to tax breaks and penalties. Blumberg's findings illustrate the increase in insurance-related costs that may influence the net income of insurance companies.

Garthwaite conducted a study on the impact of the State Children's Health Insurance Program (SCHIP), a similar program to the ACA, but with emphasis on children. His article will serve as an example to follow in assessing the effects of the ACA. Garthwaite performed a regression analysis to find the amount of time spent in a doctor's office. He used a mixed-economy model to analyze both the time spent in the office and how the number of visits to a doctor's office changed marginal costs and marginal revenues of insurance companies. He used variables that consisted of various surveys, such as the Community Tracking Study Physician Survey (CTS), reimbursement rates, eligibility rates, growth rates in costs, revenue growth for Medicare, and other measures. Garthwaite found that the expansion of the SCHIP would increase Medicare revenues use by five percent. He also reported that physicians found it harder to see all patients from the increased demand (Garthwaite 2012). His study is based on data regarding the economy but fails to examine the effects on the balance sheet of insurance companies, or programs that influence insurances companies. In this study, the focus is on the change in net income of various health insurance providers caused by the ACA. Although Garthwaite's research was not on the ACA, the SCHIP research should have similar outcomes for this study.

Dong conducted statistical and regression analysis using the event study method to project the impact of the ACA on the health care sectors throughout the economy. He used the following variables, "cumulative abnormal returns (CAR) on size (total asset), growth premium (market-to-book), leverage (asset-to-equity), capital investment (capital expenditure), and management incentive (pay-for-performance sensitivity) with industry and year fixed effects," within his regression to explain abnormal returns caused by the ACA. He found that the empirical data showed optimistic returns in the health insurance sector. He included all variables that indicate financial health of the health insurance companies to project the influence of the ACA (Dong 2014). Although the financials will show influence from the ACA, like increased revenues or insurees, the data does not capture all the data needed to accurately depict the effects of the ACA. The research negates macroeconomic influences, such as the federal funds rate.

This study will use many of the same variables from Dong's article, i.e., those that capture the health of the population, economic indicators (job growth by sector, premiums, etc.), and average health costs. Instead of cumulative average return as an independent variable, net income will be used. Changing the independent variable to net income will allow other data other than financial indicators, like the current ratio, to examine the impact of the PPACA. Also, instead of the whole health insurance sector, the effects on three insurance companies' (UnitedHealth Group, Anthem

Inc., and Centene Corp.) net income will be investigated. These companies are various sizes and focus on different target groups for clientele. For instance, Centene Corp. is the largest provider of Medicaid and Medicare while UnitedHealth Group and Anthem Inc. focuses more on employer-sponsored markets. Additionally, UnitedHealth Group is the largest health insurance company, Anthem is the second largest, and Centene is much smaller. By isolating the independent variable to these companies' net income will also alleviate some of the errors discussed by Dong, such as recent news and developments that cause abnormal growth. Using few firms will lose the market sector variability, but it will capture the real effects of the PPACA more significantly. I hope to show that the PPACA positively impacted all three varying size companies.

Although Garthwaite's and Dong's articles are similar, little research has been done to measure the impact of the PPACA on an individual company. The articles allow us to see the expected effects on the industry. In Conover's analysis, he analyzes the income and balance sheets of the large insurance companies, including UnitedHealth Group. The analysis indicates that there may have been increased returns caused by the PPACA (Conover 2014). Additionally, Wilensky's study finds that there is a trickle-down effect from the PPACA, i.e., the expenses are placed on insurers, then to businesses, and finally to consumers (Wilensky 2011). Such a trickle-down effect should increase returns for insurance companies. This study aims to show the beneficial impacts of the PPACA on UnitedHealth Group's, Anthem Inc.'s, and Centene Corp.'s net income.

IV. Methodology and Theory

The ACA forces individuals to obtain health insurance, thus increasing the size of the insurance pool (including increasing the number of healthy individuals insured). This in turn stimulates income growth for insurers as more premiums are received. Figure 17 shows no visible change in net income after the signage or revisionary dates of the ACA, but there is a clear increase in net income after the implementation of the ACA. UnitedHealth Group and Centene Corp. have a strong upward trend after the implementation date, while Anthem Inc. does not show a distinct trend. The impact of the ACA on the net income of UnitedHealth Group, Anthem Inc., and Centene Corp. is assessed using the model from Dong's study. He examines the impact of the ACA on the cumulative average returns and employs the following independent variables: log of total assets, market to book value, leverage ratio, capital expenditure, pay-for-performance sensitivities, return on asset, research and development, cash ratio, large institutional ownership, and health care-specialized institution ownership. The model is captured by the following equation:

$$Y_t = \beta_0 + \beta_1 \, ACA_t + \beta_2 \, X_t + \varepsilon_t$$

where Y_t is cumulative average returns in time t, ACA is the dichotomous variable indicating implementation of the ACA, and X is a vector of the stated regressors. (Dong 2014).

Dong's research supports the theory that the implementation of the ACA is beneficial to healthcare companies, as reflected in the higher market returns experienced by health insurers

following the ACA implementation. Since stock movement is contingent on the change of earnings, Dong's findings should be supported and reinforced by the impact of the ACA on the net income of healthcare companies. His study does not control for macroeconomic forces, such as interest rate changes, average wage, or unemployment rates that may influence the hypothesized relationship between the financial performance of health insurance companies and the ACA implementation.

To control for other factors that may affect the true impact of the ACA implementation, the following variables are used: federal funds rate, unemployment rate, private wage, five-to-nine doctors' visits, and current ratio. Linear, quadratic, and logarithmic models are used to find the best-fit model. After the best fit model is found, that model is tested for heteroskedasticity, multicollinearity, and serial correlation. The following section describes the results and further explains the methodology.

V. Data Analysis

A. UnitedHealth Group

The four ordinary least squares regressions used in Figure 4 are a linear model, a quadratic model, a semi-log left model, and semi-log left model corrected for heteroskedasticity. Initially, the best fit model is the semi-log left model. The semi-log left model has the highest F-statistic, indicating the highest predictive power. At first glimpse, this model seems to be the best until testing, and adjusting for, heteroskedasticity.

Using the White's test, depicted in Figure 7, the regression is not found to have heteroskedasticity, or having unequal variation in the independent variable's variance. Observing the Probability Chi-Square of the Obs*R-squared from the semi-log left regression in Figure 7, there is not enough evidence to reject the null hypothesis since the Probability Chi-Square is greater than (0.15), the necessary threshold of a 95% confidence interval, indicating homoskedasticity. Although there is not significant heteroskedasticity, to correct for small amounts of heteroskedasticity, the Huber-White regression is used, as shown in Figure 4, model 4. By doing so, the standard errors, t values, and p values are adjusted for potential heteroskedasticity. The new best model is the semi-log left model corrected for heteroskedasticity.

Additionally, autocorrelation and multicollinearity are tested for, as shown in Figure 10 and Figure 13. The initial semi-log left model exhibits multicollinearity. Figure 10 shows variation inflation factors (VIFs) greater than five, thus showing too much similarity in the variables. Although the high VIFs appear to be a concern, the high VIFs are caused from the squared term of Adjusted Private Wage. From the squared term, the regression does not conclusively indicate that there is a multicollinearity issue.

Through the AR(1) method, autocorrelation is tested. The AR(1) term is not found to be significant. Moreover, the Durbin-Watson d Test, Figure 13, the Durbin-Watson statistic is 2.06. Having seven variables and 64 sample size, the upper Durbin-Watson statistic is 1.84. With the

Durbin-Watson statistic from the regression greater than the upper Durbin-Watson statistic indicates that the initial semi-log left model does not suffer from autocorrelation.

We are testing for the effect of the ACA Implementation on the net income of UnitedHealth Group, projecting a positive impact. Initially, while using the linear model, the ACA appears to be significant at the 90% confidence level, but when adjusting to non-linearity models, the results are not significant. The semi-log left model decreases the variance of net income, thus condensing the data set.

Based on the regression results, one can conclude that the ACA does not have a significant impact on the net income of UnitedHealth Group. There should a positive relationship between the implementation of the ACA and the net income of the insurance companies because the ACA requires individuals to obtain insurance. Greater demand would conceivably increase net income, but the model does not show the increase. The regression shows the increase in net income has a significantly positive relationship with the current ratio and the private wage rate, but at an increasing rate. As the current ratio increases by one, the net income of UnitedHealth Group will increase 190%. As the private wage increases by one dollar, the net income of United Health group will increase 68%. The private wage grows at a slight increasing rate, as shown in the significance of the private wage squared term. Overall, there is no evidence that the ACA has had an impact on the net income of UnitedHealth Group.

B. Anthem Inc.

The four ordinary least squares regressions presented in Figure 5 are a linear model, a quadratic model, a semi-log left model, and semi-log left model corrected for heteroskedasticity. Similar to UnitedHealth Group, the best fit model is initially the semi-log left model. The semi-log left model has a higher F-statistic compared to the other regressions. Contrary to UnitedHealth Group, the linear model does not show significance for the ACA, nor does the quadratic model, but the semi-log left model does show significance at the 90% confidence level. The adjusted R-squared is higher because the variance in the data set decreases as the range of the dependent variable decreases, or the range of a non-logarithmic function versus a logarithmic function. The adjusted R-squared of the semi-log model explains 52.5% of the variation in net income. Although this has a high margin of error, it has significant correlation via p values.

After testing for heteroskedasticity, multicollinearity, and serial correlation, the semi-log left model does not exhibit these common regression issues. Using White's heteroskedasticity test (Figure 8), the results show an Obs*R-squared of 33.11 and a Probability Chi-Square of 0.27. The Probability Chi-Square of 0.27 is not significant enough to reject the null hypothesis so the regression shows homoscedasticity. Although there is no evidence of heteroskedasticity problems, the Huber-White heteroskedasticity regression correction is used to correct for any potential heteroskedasticity issues.

Testing for multicollinearity (Figure 11), the semi-log left regression exhibits variance inflation factors higher than five, indicating multicollinearity. Similar to UnitedHealth Group, the variance inflation factors are greatly skewed and inflated due to the squared adjusted private wage. There is no expected multicollinearity in the model, thus no corrections are necessary.

Performing the AR(1) method to test for serial correlation (Figure 14), the Durbin-Watson statistic is 1.84, falling in the lower and upper bounds of the Durbin-Watson d test (1.25-1.88). Falling between the range of 1.25-1.88 indicates an inconclusive result. The Breusch-Godfrey Serial Correlation Test is used to double check the results (Figure 16). The results indicate no serial correlation, as demonstrated by the probability Chi-Square of 0.26 from the Obs*R-squared of 2.67. The probability chi-square of 0.26 does not have significance at the 10% confidence level. Thus, the null hypothesis cannot be rejected, which shows no signs of autocorrelation.

Unlike UnitedHealth Group, the ACA has had a positive impact on the net income of Anthem Inc. with a 95% confidence level (Figure 5). According to the semi-log left model corrected for heteroskedasticity, there is a 65% increase in the net income of Anthem Inc. around the time of the ACA Implementation. Although the Act Implementation variable shows significance in the model, the two other variables, the Federal Funds Rate and the Unemployment variable, do not show what would be expected, adding skepticism of the validity of the model. The Federal Funds Rate variable and the Unemployment variable are significant at the 99% level. The model suggests that as the Federal Funds rate increases by one percent, net income will increase by 33%. We would expect to see the opposite because the cost of lending would increase, thus having a negative impact on net income. Similarly, as unemployment increases by one percent, the net income will increase 27%. We would expect to see the opposite because more individuals employed theoretically increases the number of individuals on a company's health insurance plan, as Anthem's and UnitedHealth Group's main target groups are employed individuals. Also, with the ACA implementation, more individuals are favoring the government health insurances, such as Medicare or Medicaid, rather than private companies. Ultimately, this regression shows significance for the ACA Implementation, but the variance may be too great to have conclusive causation.

C. Centene Corp.

The four ordinary least squares regressions used in Figure 6 are a linear model, a quadratic model, a semi-log right model, and the linear model corrected for heteroskedasticity. The semi-log left model could not be used, because there are negative values in the dependent variable's data set. Contrary to UnitedHealth Group and Anthem Inc, Centene Corp.'s best initial regression is the linear model. The linear model is the best because it has the highest F-statistic. Using the best fit model, or the linear model corrected for heteroskedasticity, the ACA Implementation is significant at the 99% level, showing the positive relationship as expected. The adjusted R-squared of the linear model explains 61.5% of the variation in net income.

The linear model is tested for heteroskedasticity, multicollinearity, and serial correlation. Using the White heteroskedasticity test (Figure 9) results in an Obs*R-squared of 25.73 and the Probability Chi-square of 0.42. The Probability Chi-square signifies that the null hypothesis cannot be rejected, showing no immediate signs of heteroskedasticity. To ensure the linear model is not impacted by heteroskedasticity, the Huber-White heteroskedasticity correction regression is used. The linear model corrected for heteroskedasticity is the best model.

Unlike UnitedHealth Group and Anthem Inc., Centene Corp. shows no signs of multicollinearity (Figure 12). The variance inflation factors are all less than the threshold of five. This model does not show signs of multicollinearity like the other companies, because there is no squared term skewing the regression.

Performing the AR(1) method to test for serial correlation (Figure 15), the Durbin-Watson statistic is 1.96. The Durbin-Watson d test lower and upper bounds are 1.34-1.84 with a sample size of 58 and six variables. Being that the Durbin-Watson Statistic is above the upper bound of the Durbin-Watson d test, the null hypothesis cannot be rejected, indicating no signs of serial correlation.

Centene Corp. is the smallest insurance firm in the analysis and is the largest Medicaid managed care company that serves veterans and military family members. Since Centene Corp. relies on governmental insurance programs to a larger extent than the other two health insurers, as the ACA was implemented, many individuals chose to adopt Centene Corp.'s medical insurance, thus increasing revenue. The positive results of the ACA are expected.

Additionally, the linear model corrected for heteroskedasticity (Figure 6, model 4) also shows significance for Adjusted Private Wage. It also shows significance at the 95% level for unemployment and Five-to-nine doctors' visits. As private wage increases by one dollar, the net income of Centene Corp. will increase by $3.97 million. The increase in net income may be due to the increase in disposable income. As the percent of individuals going to the doctor's five-to-nine times increases by one percent, the net income of Centene Corp. will increase by $14.9 million. Although this may seem incorrect, Centene Corp. may be subsidized by the government for supporting their program and veterans. As unemployment increases by one percent, the net income of Centene Corp. will decrease by $6.97 million. This decrease is likely caused by the decrease in disposable income from losing employment.

Since results are in line with expectations, the regression model seems to hold. Unlike in the case of UnitedHealth Group, the ACA Implementation is significant. Also, Centene Corp.'s significance level for the ACA Implementation variable is much stronger than Anthem Inc.'s. The ACA Implementation seems to have a positive benefit to Centene Corp.'s net income.

VI.   Conclusion

From the regression results reported for the three health insurance companies, it can be concluded that the ACA has had a positive effect on Centene Corp. and Anthem Inc. The ACA Implementation does not seem to influence UnitedHealth Group's net income. The findings suggest UnitedHealth Group's decision to withdraw from the ACA may have been a missed opportunity. Larger insurance pools from the ACA have increased the income of health insurance companies. UnitedHealth Group did not leverage the ACA law to the same extent as Anthem Inc. and Centene Corp. because they decided to withdraw prematurely from supplying insurance to ACA individuals. Many health insurance companies, including UnitedHealth Group and Anthem Inc., are lobbying against current political ideals to remove the cost-sharing reductions and individual mandate of the Act. If cost-sharing reductions are removed, it is

projected that there will be an increase in premiums by 20 to 25 percent to the ACA insurees (Japsen 2017).

Since Centene Corp. and Anthem Inc. have benefited from the passage of the Act, the repeal of the ACA may have negative implications for some insurance companies' financial performance and could have an economic impact. Anthem Inc. and Centene Corp. employ many individuals; if income was lost from the repeal of the ACA, the firms would likely lay off workers. On a mass scale, if insurance companies and other industries lose income, the unemployment rate may increase. Ultimately, if the ACA is repealed, there may be financial repercussions, as shown in this study.

VII.   Appendix

Figure 1: UnitedHealth Group's Descriptive Statistics

UNH Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Adjusted Net Income	70	241.89	2284.00	1115.74	502.61
Federal Funds Rate	70	0.07	6.52	1.78	2.05
ACAI	68	0	1	0.18	0.38
Unemployment	69	4	10.50	6.28	1.79
Adjusted Private Wage	71	0	45.98	35.94	9.14
Adjusted Private Wage Squared	71	0	2113.75	1374.17	477.47
Five to Nine Doctor Visits	64	23	26.00	24.76	0.72
Current Ratio	70	0.62	0.91	0.75	0.07

The minimum number of observations for each variable is 64. The data range includes Quarter 1 of 2000 through Quarter 4 of 2016. The independent variable is Net Income Adjusted for Inflation. Adjusted Net Income is denominated in millions. Net Income is adjusted to Quarter 4 of 2016 inflation. The control variables are Federal Funds Rate, Affordable Care Act Implementation (ACAI), Unemployment, Adjusted Private Wages, Adjusted Private Wage Squared, Five to Nine Doctor Visits, and Current Ratio. Federal Funds Rate is the overnight percentage that banks lend to each other. ACAI is a dummy variable that depicts when the ACA is implemented. Unemployment is the percentage of workers in the United States economy that are not employed. Adjusted Private Wage is the average wage, adjusted to quarter 4 of 2016 inflation, that privately employed individuals are earning. Adjusted Private Wage Squared tests for a nonlinear relationship between Adjusted Net Income and Adjusted Private Wage. Five to Nine Doctor Visits is a percentage of how many times one goes to a doctor's office. Current Ratio is a ratio that measures the amount of assets per the amount of liabilities.

Figure 2: Anthem Inc.'s Descriptive Statistics

ANTM Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Adjusted Net Income	58	154.37	3081.65	731.34	402.16
Federal Funds Rate	58	0.07	5.26	1.33	1.75
ACAI	56	0	1	0.21	0.41
Unemployment	57	4	10.50	6.57	1.80
Adjusted Private Wage	58	0	42.65	35.09	7.66
Adjusted Private Wage Squared	58	0	1818.95	1289.11	366.12
Five to Nine Doctor Visits	52	23	26.00	24.69	0.77
Current Ratio	58	0.71	2.10	1.54	0.42

The minimum number of observations for each variable is 52. The data range includes Quarter 1 of 2003 through Quarter 4 of 2016. The independent variable is Net Income Adjusted for Inflation. Net Income is adjusted to Quarter 4 of 2016 inflation. Adjusted Net Income is denominated in millions. The Adjusted Net Income range is the greatest for Anthem Inc. as it has a large spike in Net Income due to the sale of NextRx. The control variables are Federal Funds Rate, Affordable Care Act Implementation (ACAI), Unemployment, Adjusted Private Wages, Adjusted Private Wage Squared, Five to Nine Doctor Visits, and Current Ratio. Federal Funds Rate is the overnight percentage that banks lend to each other. ACAI a dummy variable that depicts when the ACA is implemented. Unemployment is the percentage of workers in the United States economy that are not employed. Adjusted Private Wage is the average wage, adjusted to quarter 4 of 2016 inflation, that privately employed individuals are earning. Adjusted Private Wage Squared tests for a nonlinear relationship between Adjusted Net Income and Adjusted Private Wage. Five to Nine Doctor Visits is a percentage of how many times one goes to a doctor's office. Current Ratio is a ratio that measures the amount of assets per the amount of liabilities.

Figure 3: Centene Corp.'s Descriptive Statistics

CNC Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Adjusted Net Income	64	-85.48	262.82	38.22	56.85
Federal Funds Rate	64	0.07	5.26	1.40	1.69
ACAI	62	0	1	0.19	0.40
Unemployment	63	4	10.50	6.48	1.74
Adjusted Private Wage	65	0	44.03	35.04	8.90
Adjusted Private Wage Squared	65	0	1938.27	1305.55	429.79
Five to Nine Doctor Visits	58	23	26.00	24.74	0.76
Current Ratio	64	0.80	1.58	1.04	0.14

The minimum number of observations for each variable is 58. The data range includes Quarter 3 of 2001 through Quarter 4 of 2016. The independent variable is Net Income Adjusted for Inflation. Net Income is adjusted to Quarter 4 of 2016 inflation. Adjusted Net Income is denominated in millions. The only company to have negative Net Income is Centene. The control variables are Federal Funds Rate, Affordable Care Act Implementation (ACAI), Unemployment, Adjusted Private Wages, Adjusted Private Wage Squared, Five to Nine Doctor Visits, and Current Ratio. Federal Funds Rate is the overnight percentage that banks lend to each other. ACAI is a dummy variable that depicts when the ACA is implemented. Unemployment is the percentage of workers in the United States economy that are not employed. Adjusted Private Wage is the average wage, adjusted to quarter 4 of 2016 inflation, that privately employed individuals are earning. Adjusted Private Wage Squared tests for a nonlinear relationship between Adjusted Net Income and Adjusted Private Wage. Five to Nine Doctor Visits is a percentage of how many times one goes to a doctor's office. Current Ratio is a ratio that measures the amount of assets per the amount of liabilities.

Figure 4: UnitedHealth Group's Regression Results

Indep. Var.	Model 1	Model 2	Model 3	Model 4
Constant	-381.97	-3013.17	6.37***	-6.37**
	(1338.67)	(2085.97)	(2.49)	(3.14)
Federal Funds Rate	-3.17	2.50*	-0.04	-0.04
	(21.46)	(21.44)	(0.03)	(0.02)
ACA Implementation	-220.49*	-89.18	0.06	0.06
	(113.33)	(137.78)	(0.16)	(0.16)
Unemployment	-20.34	-11.36	-0.05	-0.05
	(26.54)	(26.74)	(0.03)	(0.04)
Adjusted Private Wage	71.87***	231.30**	0.68***	0.68***
	(9.96)	(98.38)	(0.12)	(0.14)
Adjusted Private Wage Squared		-2.23*	0.01***	0.01***
		(1.37)	(0.00)	(0.00)
Five to Nine Doctor Visits	-92.55**	-96.14**	-0.06	-0.06
	(46.43)	(45.83)	(0.05)	(0.06)
Current Ratio	1612.16***	1393.71***	1.89***	1.89**
	(475.37)	(487.44)	(0.58)	(0.88)
Adj. R^2	0.861	0.865	0.885	0.898
SE of Regression	165.340	162.994	0.194	0.194
F-Statistic	66.031	58.618	70.546	70.546
Prob(F-Stat)	0.000	0.000	0.000	0.000

Model 1: Linear OLS Regression, Model 2: Quadratic OLS Regression, Model 3: Semi-Log Left OLS Regression, Model 4: Huber-White Heteroskedasticity Correction on Semi-Log Left OLS Regression

@ The standard error appears in parentheses below each coefficient. *** indicates significance at the 99% level. ** indicates significance at the 95% level. * indicates significance at the 90% level.

Impact of the Affordable Care Act

Figure 5: Anthem Inc.'s Regression Results

Indep. Var.	Model 1	Model 2	Model 3	Model 4
Constant	-1651.78	-1657.84	-6.74	-6.74
	(3163.53)	(10588.62)	(11.14)	(9.42)
Federal Funds Rate	199.87***	199.85***	0.33***	0.33***
	(68.98)	(75.03)	(0.08)	(0.07)
ACA Implementation	353.65	353.75	0.65*	0.65*
	(271.68)	(316.24)	(0.33)	(0.36)
Unemployment	207.24***	207.21***	0.27***	0.27***
	(59.06)	(71.75)	(0.08)	(0.10)
Adjusted Private Wage	19.75	20.09	0.54	0.54
	(29.12)	(569.46)	(0.60)	(0.56)
Adjusted Private Wage Squared		0.00	-0.01	-0.01
		(8.13)	(0.01)	(0.01)
Five to Nine Doctor Visits	3.84	3.85	0.02	0.02
	(100.67)	(103.21)	(0.11)	(0.08)
Current Ratio	-100.31	-100.27	-0.01	-0.01
	(191.17)	(207.03)	(0.22)	(0.17)
Adj. R^2	0.279	0.263	0.525	0.590
SE of Regression	356.237	360.263	0.379	0.379
F-Statistic	4.295	3.600	9.037	9.037
Prob(F-Stat)	0.002	0.004	0.000	0.000

Model 1: Linear OLS Regression, Model 2: Quadratic OLS Regression, Model 3: Semi-Log Left OLS Regression, Model 4: Huber-White Heteroskedasticity Correction on Semi-Log Left OLS Regression

@ The standard error appears in parentheses below each coefficient. *** indicates significance at the 99% level. ** indicates significance at the 95% level. * indicates significance at the 90% level.

Figure 6: Centene Corp.'s Regression Results

Indep. Var.	Model 1	Model 2	Model 3	Model 4
Constant	442.74***	-337.12	-331.33	442.74***
	(156.79)	(345.20)	(338.38)	(166.70)
Federal Funds Rate	-3.68	-3.11	-3.10	-3.68
	(2.81)	(3.29)	(3.28)	(3.78)
ACA Implementation	41.38***	38.51**	38.34**	41.38***
	(14.09)	(16.49)	(16.52)	(15.80)
Unemployment	-6.92**	-6.60**	-6.62**	-6.92**
	(3.13)	(3.30)	(3.31)	(2.89)
Adjusted Private Wage	3.97***	-2.35	-2.50	3.97***
	(1.13)	(18.38)	(18.30)	(0.90)
Adjusted Private Wage Squared		0.09	0.09	
		(0.26)	(0.26)	
Five to Nine Doctor Visits	14.90***	14.93***	14.84***	14.90**
	(5.27)	(5.32)	(5.34)	(6.19)
Current Ratio, Logged for 3rd Regression	1.38	0.51	-0.99	1.38
	(18.99)	(19.32)	(21.41)	(9.87)
Adj. R^2	0.615	0.608	0.608	0.655
SE of Regression	19.140	19.308	19.308	19.140
F-Statistic	16.170	13.638	13.638	16.170
Prob(F-Stat)	0.000	0.000	0.000	0.000

Model 1: Linear OLS Regression, Model 2: Quadratic OLS Regression, Model 3: Semi-Log Left OLS Regression, Model 4: Huber-White Heteroskedasticity Correction on Linear OLS Regression

@ The standard error appears in parentheses below each coefficient. *** indicates significance at the 99% level. ** indicates significance at the 95% level. * indicates significance at the 90% level.

Figure 7: White's Heteroskedasticity Test on Semi-Log Left Model of UnitedHealth Group

Heteroskedasticity Test: White

F-statistic	1.641489	Prob. F(31,32)	0.0844
Obs*R-squared	39.29141	Prob. Chi-Square(31)	0.1458
Scaled explained SS	188.0076	Prob. Chi-Square(31)	0.0000

Figure 8: White's Heteroskedasticity Test on Semi-Log Left Model of Anthem Inc.

Heteroskedasticity Test: White

F-statistic	1.329344	Prob. F(29,22)	0.2480
Obs*R-squared	33.10683	Prob. Chi-Square(29)	0.2735
Scaled explained SS	56.92638	Prob. Chi-Square(29)	0.0015

Figure 9: White's Heteroskedasticity Test on Linear Model of Centene Corp.

Heteroskedasticity Test: White

F-statistic	1.020317	Prob. F(25,32)	0.4727
Obs*R-squared	25.72619	Prob. Chi-Square(25)	0.4223
Scaled explained SS	90.70490	Prob. Chi-Square(25)	0.0000

Figure 10: Multicollinearity VIFs on Semi-Log Left Model of UnitedHealth Group

Variance Inflation Factors
Date: 12/01/17   Time: 10:30
Sample: 1 71
Included observations: 64

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	6.184989	10482.22	NA
FFR	0.000653	8.799312	4.829815
ACAI	0.026982	5.715996	5.001497
UNEMPL	0.001016	75.74034	5.588492
ADJPRIWAGE	0.013756	32461.68	547.4996
ADJPRIWAGESQU	2.65E-06	9287.027	568.1130
FNVIS	0.002985	3103.268	2.611627
CURR	0.337727	327.1457	3.049797

Figure 11: Multicollinearity VIFs on Semi-Log Left Model of Anthem Inc.

Variance Inflation Factors
Date: 12/02/17   Time: 07:39
Sample: 1 58
Included observations: 52

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	124.1801	44920.33	NA
FFR	0.006235	11.91491	7.344360
ACAI	0.110766	6.164288	5.215936
UNEMPL	0.005702	100.0360	6.593599
ADJPRIWAGE	0.359170	168632.9	1561.739
ADJPRIWAGESQU	7.31E-05	46198.64	1623.119
FNVIS	0.011797	2602.758	2.487227
CURR	0.047471	43.49935	3.265832

Figure 12: Multicollinearity VIFs on Linear Model of Centene Corp.

Variance Inflation Factors
Date: 12/06/17   Time: 14:40
Sample: 1 65
Included observations: 58

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	24582.28	3891.769	NA
FFR	7.887092	6.516221	3.750285
ACAI	198.5384	4.335421	3.737432
UNEMPL	9.810708	72.57986	4.675149
ADJPRIWAGE	1.278611	269.1127	3.420715
FNVIS	27.79920	2696.533	2.487409
CURR	360.5047	63.77721	1.221615

Figure 13: Autocorrelation Test Regression on UnitedHealth Group

Dependent Variable: LOG(ADJNI)
Method: ARMA Maximum Likelihood (BFGS)
Date: 12/01/17   Time: 10:57
Sample: 1 64
Included observations: 64
Convergence achieved after 4 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.212146	4.118593	-1.508318	0.1373
FFR	-0.026678	0.035189	-0.758120	0.4517
ACAI	0.032366	0.235249	0.137580	0.8911
UNEMPL	-0.040056	0.039234	-1.020956	0.3118
ADJPRIWAGE	0.669122	0.177935	3.760494	0.0004
ADJPRIWAGESQU	-0.008024	0.002483	-3.232175	0.0021
FNVIS	-0.061430	0.092680	-0.662816	0.5103
CURR	1.677112	0.666006	2.518164	0.0148
AR(1)	0.166095	0.152269	1.090800	0.2802
SIGMASQ	0.032279	0.005541	5.825156	0.0000

R-squared	0.900501	Mean dependent var		6.811172
Adjusted R-squared	0.883918	S.D. dependent var		0.574082
S.E. of regression	0.195594	Akaike info criterion		-0.282512
Sum squared resid	2.065882	Schwarz criterion		0.054814
Log likelihood	19.04038	Hannan-Quinn criter.		-0.149622
F-statistic	54.30232	Durbin-Watson stat		2.056742
Prob(F-statistic)	0.000000			

Inverted AR Roots	.17			

Figure 14: Autocorrelation Test Regression on Anthem Inc.

Dependent Variable: LOG(ADJNI)
Method: ARMA Maximum Likelihood (BFGS)
Date: 12/02/17   Time: 07:46
Sample: 1 52
Included observations: 52
Convergence achieved after 5 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.291891	18.12853	-0.347071	0.7303
FFR	0.333790	0.122993	2.713893	0.0096
ACAI	0.659547	0.621837	1.060643	0.2949
UNEMPL	0.279891	0.103184	2.712555	0.0096
ADJPRIWAGE	0.524245	1.067446	0.491121	0.6259
ADJPRIWAGESQU	-0.006751	0.015459	-0.436713	0.6646
FNVIS	0.011251	0.198036	0.056815	0.9550
CURR	-0.016805	0.341370	-0.049227	0.9610
AR(1)	0.039079	0.233999	0.167006	0.8682
SIGMASQ	0.121507	0.032132	3.781551	0.0005

R-squared	0.590223	Mean dependent var		6.458266
Adjusted R-squared	0.502413	S.D. dependent var		0.549850
S.E. of regression	0.387863	Akaike info criterion		1.114742
Sum squared resid	6.318388	Schwarz criterion		1.489981
Log likelihood	-18.98330	Hannan-Quinn criter.		1.258600
F-statistic	6.721630	Durbin-Watson stat		1.837190
Prob(F-statistic)	0.000007			

Inverted AR Roots	.04

Figure 15: Autocorrelation Test Regression on Centene Corp.

Dependent Variable: ADJNI
Method: ARMA Maximum Likelihood (BFGS)
Date: 12/06/17   Time: 14:35
Sample: 1 58
Included observations: 58
Convergence achieved after 4 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-439.7296	226.9340	-1.937698	0.0584
FFR	-3.778951	4.049666	-0.933151	0.3553
ACAI	40.79531	15.85290	2.573366	0.0131
UNEMPL	-6.998856	4.954163	-1.412722	0.1641
ADJPRIWAGE	3.979330	2.193667	1.814008	0.0758
FNVIS	14.78491	7.433741	1.988893	0.0523
CURR	1.599503	39.86467	0.040123	0.9682
AR(1)	0.025559	0.146974	0.173899	0.8627
SIGMASQ	321.9419	49.22669	6.539988	0.0000

R-squared	0.655667	Mean dependent var	25.62482
Adjusted R-squared	0.599449	S.D. dependent var	30.84437
S.E. of regression	19.52112	Akaike info criterion	8.922604
Sum squared resid	18672.63	Schwarz criterion	9.242328
Log likelihood	-249.7555	Hannan-Quinn criter.	9.047143
F-statistic	11.66301	Durbin-Watson stat	1.962288
Prob(F-statistic)	0.000000		

Figure 16: Breusch-Godfrey Serial Correlation Test on Semi-Log Left Model of Anthem Inc.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.137888	Prob. F(2,42)	0.3302
Obs*R-squared	2.672802	Prob. Chi-Square(2)	0.2628

Figure 17: Net Income Graph
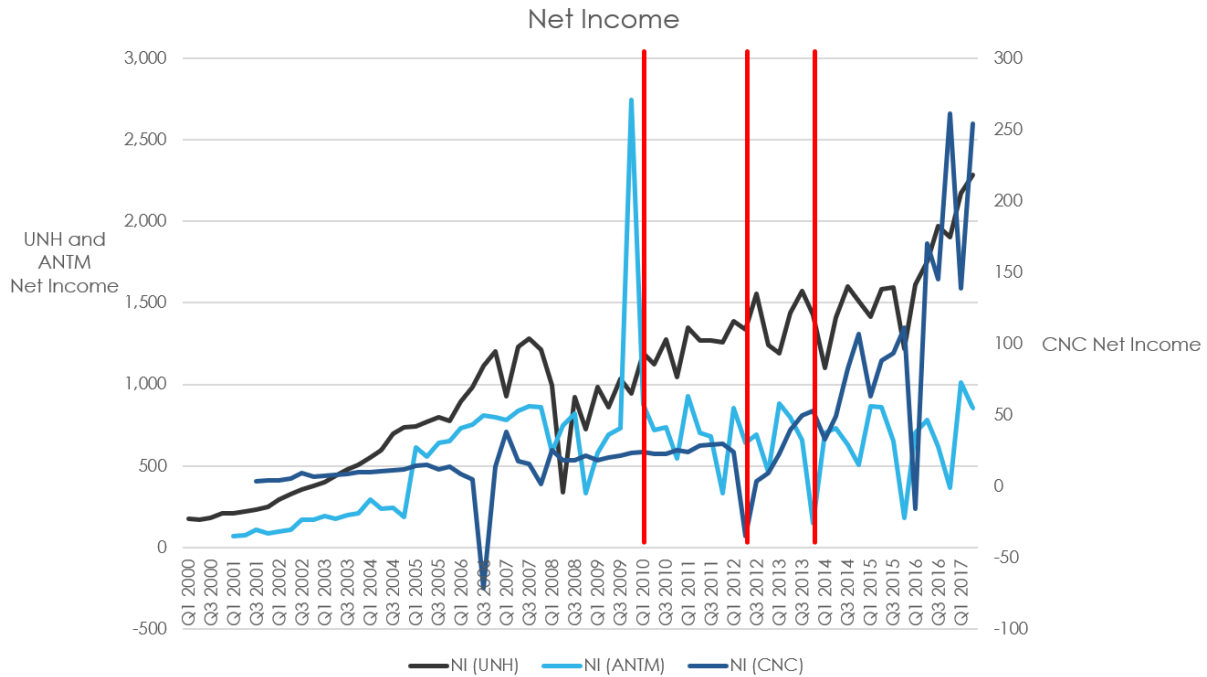
The vertical lines depict when the ACA was signed (Q2 2010), revised and approved by Supreme Court

(Q3 2012), and implemented (Q1 2014).

VIII. References

Barnett, Jessica and Marina Vornovitsky. 2016. Health Insurance Coverage in the United States: 2015. *United States Census Bureau*. https://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-257.pdf. (accessed on April 29, 2018).

Current Ratio Data for Anthem Inc. July 1, 2001 - December 31, 2016, via Bloomberg L.P., (accessed October 25, 2017).

Current Ratio Data for Centene Corp. January 1, 2003 - December 31, 2016, via Bloomberg L.P., (accessed October 25, 2017).

Current Ratio Data for UnitedHealth Group. January 1, 2000 - December 31, 2016, via Bloomberg L.P. (accessed October 25, 2017).

Blumberg, Linda J., Matthew Buettgens, Judy Feder, and John Holahan. 2012. Implications of the ACA for American Business. *Urban Institute*. https://www.urban.org/sites/default/files/publication/25906/412675-Implications-of-the-Affordable-Care-Act-for-American-Business.PDF (accessed October 1, 2017)

Conover, Chris. 2014. Profits in Health Insurance Under Obamacare. *Forbes*. https://www.forbes.com/sites/theapothecary/2014/06/27/profits-in-health-insurance-under-obamacare/#166f84863c3a (accessed October 15, 2017)

Dong, Gang. Health Care Reform and the Stock Market: Economic Impact, Growth Opportunity and Private Sector Investors. *Journal of Health Care Finance* 41, no. 2 (2014) http://healthfinancejournal.com/index.php/johcf/article/view/4/5.

Ellis, Randall, Tianxu Chen, and Calvin Luscombe. 2016. Comparisons of Health Insurance Systems in Developed Countries. *Boston University*. http://www.bu.edu/law/files/2016/01/EllisPaper.pdf.

Federal Reserve Bank of St. Louis. 2017. fred.stlouisfed.org/.

Foster, Richard. 2010. Estimated Financial Effects of the "Patient Protection and ACA," as Amended. *Department of Health & Human Services*. https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/ActuarialStudies/downloads/PPACA_2010-04-22.pdf (accessed October 2, 2017).

Garthwaite, Craig L. The Doctor Might See You Now: The Supply Side Effects of Public Health Insurance Expansions. *American Economic Journal: Economic Policy* 4, no. 3 (2012): 190-215. http://www.jstor.org/stable/23249925.

Hall, Mark, and Michael McCue. 2016. How Has the Affordable Care Act Affected Health Insurers' Financial Performance. *The Commonwealth Fund*. http://www.commonwealthfund.org/publications/issue-briefs/2016/jul/the-affordable-care-act-and-health-insurers-financial-performance. (accessed on May 1, 2018).

Howell, Tom. 2016. One-third of U.S. Could See Only One Obamacare Option as Insurers Pull Out. *The Washington Times*. https://www.washingtontimes.com/news/2016/aug/29/aetna-unitedhealth-pulling-out-of-obamacare-leavin/. (accessed on April 29, 2018).

Japsen, Bruce. 2017. Health-Care Industry Asks Senate for Two Years of Obamacare Subsidies. *Forbes*. https://www.forbes.com/sites/brucejapsen/2017/09/06/healthcare-industry-asks-senate-for-two-years-of-obamacare-subsidies/#74505f525a83.

Kaiser Family Foundation. 2017. Key Facts About the Uninsured Population. https://www.kff.org/uninsured/fact-sheet/key-facts-about-the-uninsured-population/. (accessed on April 30, 2018).

National Center for Health Statistics. 2017. Centers for Disease Control and Prevention. www.cdc.gov/nchs/hus/contents2016.htm#101.

National Center for Health Statistics. 2017. Centers for Disease Control and Prevention. www.cdc.gov/nchs/nhis/index.htm.

Nisen, Max. 2017. Anthem Shakes Up the Obamacare Narrative. *Bloomberg L.P.* https://www.bloomberg.com/gadfly/articles/2017-04-26/anthem-earnings-belie-obamacare-death-spiral-fears. (accessed on April 29, 2018).

Wilensky, Gail R. Bending and Stretching the Health Care Cost Curve. *Business Economics* 46, no. 3 (2011): 163-66. http://www.jstor.org/stable/23491022