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# THE EFFECT OF UNDERAGE DRINKING AND SOCIOECONOMIC MEASURES ON TEEN LIVE BIRTH RATES

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## ABSTRACT

While U.S. teenage live birth rates remain the highest in the developed world, these rates have consistently fallen since 1991. The period of decline corresponds to significant demographic changes, targeted policies to reduce teenage pregnancy, changes in the income distribution and changes in the prevalence of underage drinking. Reasonable arguments can be made for each of these changes as important in reducing teenage live birth rates. We employ an unbalanced state level panel for the years 1991-2017 to investigate factors responsible for the decline. Our model explains slightly more than 80 percent of the reduction in teenage live birthrate. Among the major factors explaining the decline are reductions in underage drinking, increases in high school graduation rates, and increases in the Hispanic proportion of the population. Increases in median household income are positively associated with increased teenage birthrates, a seemingly counterintuitive result unless analyzed in light of Kearney and Levine (2012) findings regarding economic hopelessness among teenage mothers. Rising overall incomes appear to magnify lower income teenage women's feelings of economic marginalization.

Keywords: Teen birthrates, underage drinking, Hispanic. income

## INTRODUCTION

Although US teenage pregnancy and live birth rates continue to rank among the highest in the developed world (Sedgh *et al*, 2015), recent trends indicate significant reductions in per capita teenage birth rates. Hamilton and Matthews (2015) report declining U.S. teen birth rates every year since 1991. Previous empirical research focuses on differences in teen birthrates across US states and countries (Kearney and Levine, 2012), socioeconomic determinants of teenage pregnancy and live birth rates (Kilebrew *et al*, 2014) and the societal impacts of teenagers giving birth (Huang *et al*, 2014). Prior models generally employ either teenage pregnancy rates or live birth rates as the dependent variable. Although arguments can be made for either of these measures, difficulties with teenage

pregnancy data related to large numbers of unreported miscarriages and abortions support live teenage birthrate as the superior measure. The existence of both state level and inter-temporal differences in attitudes toward abortion and general attitudes toward out of wedlock pregnancies suggest that these measurement errors could be systematic. This study employs a state level panel data set covering the period 1991-2017 to examine the importance of demographic, economic, and political factors for explaining variation in per capita live teenage birth rates. Special emphasis is given to explaining the U.S. decline in teenage live birth rates that began in 1990. Our model successfully explains 80.4 percent of the decline.

## LITERATURE REVIEW

It is not surprising that economic circumstance is an important predictor of whether a teenage woman gives birth. Kearney and Levine (2012) cite low economic trajectory as the primary factor explaining teenage motherhood. Schaller (2011) finds that reductions in state level aggregate unemployment rates are associated with declining teenage pregnancy, a result that she attributes to rising opportunity costs from better employment opportunities. Colen *et al* (2006) conclude that improving labor market conditions lead to reductions in birth rates among black teenage women but find no comparable effect among white teenagers. Kearney and Levine (2015) report that over the period of their state level sample (1981-2010), rising unemployment led to lower teenage birth rates. One explanation for Kearney and Levine's finding focuses on the incentive to avoid sexual behaviors that risk pregnancy when weak labor market conditions diminish resources available for childcare. The 2015 Kearney and Levine finding appears to be at odds with their primary conclusion regarding low economic trajectory as the primary determinant of the decision to engage in behavior leading to teenage motherhood. These anomalies may relate to Kearney and Levine's (2015) observations that teenagers appear to have made different choices during the period 1991-2010.

Unemployment is not the only factor determining pregnancy among teenage women. Tomal (1999) analyzed grouped data in order to identify variables related to teenage birthrates. Using county level Illinois data, Tomal finds that average education, income and percentage of children living in poverty all influence teenage birth rates. Decker *et al* (2019) attribute neighborhood level differences in teenage birthrates to employment prospects, neighborhood interactions and educational opportunity. Quinlivan *et al* (2004) find various family attributes including parental divorce during early childhood, early childhood exposure to family violence, low family income and poor educational opportunities to explain differences in the prospects for young motherhood. Similarly, Woodward, Fergusson and Horwood (2001) report strong influences on teenage pregnancy from various family factors as well as the presence of deviant peer relations. Among the family factors identified by Woodward *et al* are coercive parental child

rearing, multiple transitions in parental relationships due to divorce and marital breakdown and family environments characterized by single parenthood.

Kearney and Levine (2014) focus on the importance of income distribution finding that when the gap between income at the tenth percentile and the middle percentile widens, teenage birthrates rise. Kearney and Levine attribute their finding to the greater sense of economic marginalization brought on by increased income inequality. Moreover, Kearney and Levine (2015) conclude that the only targeted policies contributing to declining U.S. teenage birthrates are reductions in welfare payments and expanded teenage access to family planning services. Similarly, Kearney and Levine (2009) find that expanded Medicaid access to family planning services leads to a 4 percent reduction in teenage birth rates. Levine (2004) reports that there is no evidence, however, of a relationship between restricted abortion access and teen births. Koball (2007) finds that requiring teenage mothers under age 18 to live with parents as a welfare benefit requirement positively impacts high school graduation rates. Given the strong relationship between educational attainment and teenage births, an argument can be made that the aforementioned welfare eligibility requirements reduce the likelihood of subsequent pregnancies. Yang and Gaydous (2010) report that availability of Medicaid family planning waivers tend to lower teen birth rates whereas implementation of abstinence only programs have the opposite effect.

Foster *et al* (2003) provide extensive statistical evidence regarding the widespread use of alcohol by teenagers. Although common sense dictates the potential for a causal relationship, few studies directly address the issue of teenage birthrate and underage drinking. Most prior research focuses on the increased likelihood that teens will engage in sex and/or risky sexual behavior as one of the many costs associated with underage alcohol consumption (Miller *et al*, 2006). Kilebrew *et al* (2014) report that teenagers with documented pregnancy histories generally report alcohol use prior to engaging in sexual intercourse. Chen, Yi and Faden (2013) find a relationship between teenage alcohol consumption and a myriad of risky teen sexual behaviors including unprotected sex, having multiple partners and being drunk while having sexual intercourse. While evidence of a relationship between teenage alcohol use and risky sexual behavior offers indirect evidence that alcohol use contributes to behaviors that could lead to pregnancy, none of these studies offer direct evidence of a relationship between underage drinking and live teenage birthrates.

Two recent studies do offer such direct evidence. Cintina (2015) uses the 1979 cohort National Longitudinal Survey of Youth data to demonstrate that less restrictive access to alcohol decreases the probability of first pregnancy and abortion. Salas-Wright *et al* (2015) offer strong evidence that pregnant teenage women were significantly more likely to have experimented with drugs and/or alcohol as compared to their peers who were never pregnant. Although each of these articles represent significant contributions to our understanding of the relationship between underage drinking and teenage pregnancy, each study suffers

from data limitations. Cintina's sample was limited to the single 1979 cohort of young people. Although the Sala-Wright sample covers more years, their data do not capture the full period of falling teenage live birth rates from 1991 to the most recently available data. Moreover, both of these studies use teen pregnancy *in lieu* of the superior teenage live birthrate to measure outcomes. The remainder of this paper is devoted to developing and testing a model which examines the relationship between teenage live birthrate, various demographic factors, political variables and underage drinking. State level panel data covering the period 1991-2017 are used to examine factors responsible for the decline in live teenage birthrate observed over that period.

## DATA AND MODEL

Data were collected from several sources, including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, FRED (Federal Reserve Economic Data), and the Center for Disease Control (CDC). Data cover the period 1991 through 2017 for all fifty states and the District of Columbia. Due to constraints imposed by state level underage drinking data availability described below, the completed sample consists of an unbalanced panel containing 421 observations. The missing observations are not systematic and are therefore capable of estimator consistency (Cameron and Trivedi, 2010).

### Model

The model specification can be found in equation 1:

(1) *Live Teen Births$_{it}$ = α + β (Underaged Drinking Pct) + θX$_{it}$ + λC$_i$ + ε$_{it}$*

where $X_{it}$ includes the explanatory control variables in states $i$ at time $t$, Underaged Drinking Pct$_t$ is a continuous variable measuring the percentage of people under the legal drinking age reporting alcohol consumption, and $C_i$ is a set of unobserved characteristics that are constant at the state level over time. Our expectation is that underage drinking exerts a positive impact on live teen birth rate.

We use a Hausman test for choosing the appropriate model to control for unobserved heterogeneity inherent in panel data. The test rejects the null hypothesis of no correlation between the unobserved effects and the included regressors, indicating that the fixed effects model provides more efficient and consistent estimates than the random effects model (Cameron and Trivedi, 2010). We estimate state fixed effects with robust standard errors.

**Live Teen Births**: The dependent variable is live teen births per thousand, calculated as number of live births to young women age 15 to 19 per 1,000 in states over time. Mean live teen births have decreased in the U.S. by 67 percent during our observation period, 1991 through 2017. However, the difference between the

state with the lowest rate and the state with the most live teen births in 2017 is still 25 births per 1,000 of the population.  Though the difference remains a source of concern, the gap has narrowed from a difference of 77 teen births per 1,000 in 1991.  Live teen birth data were obtained from the U.S. Dept. of Health and Human Services Natality public use data, and The Annie E. Casey Foundation.

## Independent Variables

Underage Drinking Rates: Underage drinking is measured as the percentage of students in 9th through 12th grades reporting alcohol consumption within the previous thirty days.  Prior research suggests a positive relationship between alcohol use and risky sexual activity among teenagers (Kilebrew, 2014; Chen et al, 2013). Data were obtained from the CDC's Youth Risk Behavior Surveillance System (YRBSS) survey results.  The survey is conducted every other year, thus reducing the number of observations available during a given timeframe. In addition, all states did not opt into the survey at the same time, creating the opposite of an attrition problem with the number of participants growing rather than shrinking over time. Constraints imposed by underage drinking data resulted in a dataset with 421 observations over a twenty-seven year period.  According to survey results, mean reported underage drinking has decreased by about 42 percent between 1991 and 2017 nationally.  Nevertheless, a 10 point difference remains between states with the lowest and highest underage drinking values in 2017.

Income Inequality: Kearney and Levine (2014) report a positive relationship between income inequality and teenage birth rates using an analysis of income quintile gaps.  We chose the Gini coefficient as our measure of U.S. income inequality.  From 1991 to 2017, the mean state level Gini coefficient decreased by 17 percent, or about 10 points. Gini coefficients are measured on a scale of zero to 100, with higher values indicating greater income inequality.  We obtained income inequality data from the Federal Reserve Bank of St. Louis (FRED).

Median Household Income: Tomal (1999) and Quinlivan (2004) find evidence of a negative relationship between income and teenage birthrates.  We use median household income to test this relationship.  Median household income increased by 11.4 percent on average in the U.S. during our observation period, or about $6,000.  However, the difference between states with the lowest median household income and those with the highest is still about $40,000.  Income data comes from the U.S. Census Bureau Current Population Survey, 2017.

Unemployment: The literature suggests that unemployment rates could affect teen birth rates positively or negatively (Schaller, 2011; Kearney and Levine, 2015). Colen et al (2006) find a positive effect for white women only.   Unemployment rates, reported by the Bureau of Labor Statistics (2018), are slightly lower at the end of our observation period than at the start. Given the cyclical nature of

unemployment over the long run, conclusions cannot be reached based upon changes in rates between 1991 and 2017.

High School Graduation Rates: Educational attainment is often used to explain teen birth rates and other measures of sexual activity (Tomal, 1999; Koball, 2007). Mean national high school graduation rates have increased by nearly nine percentage points from 1991 to 2017. However, a relatively wide gap exists between states over time, though the gap has tightened between 1991 and 2017. In 1991 there was a 36 point gap between the lowest and highest ranked state. The graduation gap fell to just 20 points in 2017. We would argue that while the gap remains high, significant leveling of graduation rates occurred over our sample period. Data were obtained from the Southern Regional Education Board (2019).

Poverty Rates: The poverty rate measures the percentage of households in the state with monthly incomes lower than the federal poverty guidelines. These guidelines account for family size and composition in determining basic income requirements. Poverty rates tend to fluctuate with national and state level business cycles making long run comparisons across specific years and states difficult. Due to the short run nature of many of the factors influencing teenage pregnancy, poverty rates remain potentially important for explaining variation in live teenage birth rates.

Race: To control for the impact of race on live teen births, we include measures of white, black, Hispanic and Asian residents as a percentage of total state population, obtained from the U.S. Dept. of Health and Human Services, CDC and the National Center for Health Statistics. Over the span of our sample, there have been significant changes in the racial composition of the U.S. Between 1991 and 2017, the white proportion of the population decreased by about 11 percent while the black population increased slightly more with a 13 percent increase. However, the greatest changes occurred among Hispanic and Asian populations. Over our twenty seven year observation period, the percentage of Hispanic residents increased 108 percent, while the Asian population increased just over 89 percent.

State Level Political Factors: To test the impact of political factors on teen birth rates we identify government leadership by political party. We use time variant binary variables to indicate whether the chambers of state government were both majority Republican, both majority Democrat, or whether political power was mixed. We also identify the political party of the state governor. Realizing the potential for delayed impacts for state policies we estimated models including lags for one, two and three periods for each political variable. Finding no evidence of lagged effects for any of the political variables, our models use concurrent values. Political party data comes from the National Association of State Legislatures. See Table 1 for summary statistics of all included variables.

**Table 1** Summary Statistics

| Variable | Mean | Standard Dev | Minimum | Maximum |
|---|---|---|---|---|
| LiveTeenBiths | 40.5 | 16.35253 | 8.0 | 113.0 |
| Underage_Drinking | 39.3 | 9.277711 | 10.6 | 61.2 |
| UnemplRate | 5.6 | 1.861801 | 2.3 | 13.7 |
| MedHHInc 1000 | 56.8 | 90.89414 | 34.2 | 82.9 |
| HSGradRates | 76.6 | 8.055908 | 49.7 | 91.4 |
| PovertyRates | 12.9 | 3.622917 | 4.5 | 26.4 |
| Ginix100 | 49.2 | 6.060729 | 38.4 | 68.8 |
| White | 75.1 | 16.59949 | 21.0 | 98.5 |
| Black | 11.1 | 11.38186 | 0.3 | 65.4 |
| Hispanic | 8.8 | 9.5493 | 0.4 | 52.4 |
| Asian | 3.7 | 7.618794 | 0.4 | 64.0 |
| DemHS | 0.427 | 0.4948243 | 0 | 1 |
| SplitHS | 0.204 | 0.4031645 | 0 | 1 |
| DemGov | 0.456 | 0.4982468 | 0 | 1 |
| OtherGov | 0.018 | 0.1335618 | 0 | 1 |

## ESTIMATION RESULTS

Table 2 contains empirical estimation of the coefficients for equation 1 presented above. Examining Table 2, we note that the coefficient for median household income is positive and statistically significant at the .05 level. A positive and significant coefficient does not fit our *a priori* expectation based upon previous literature. We investigated possible sources of multicollinearity and other data anomalies that could erroneously produce this result and could not identify violations of the Gauss Markov assumptions or other econometric problem as the root cause. After estimating several iterations of the model, we concluded that the positive and significant coefficient for median income was robust to all model variation with the exception of excluding the Gini coefficient. When the Gini coefficient is omitted from the model, the coefficient for median income becomes insignificant at all generally accepted significance levels. Sensitivity of the median income coefficient to the exclusion of the Gini coefficient suggested the potential for interactive effects between median income level and income inequality. Estimation of a model which includes interaction effects revealed a non-significant coefficient for the interaction term and an $R^2$ identical to two decimal places. Given the lack of statistical significance for the interaction term and nearly identical $R^2$, we report results based upon the model excluding the interaction term.

The combined results for median income and the Gini coefficient provide evidence for the importance of relative income in determining teenage birthrates. Kearney and Levine (2014) interpret their finding regarding the ratio of median income to

income at the lowest ten percent of the distribution as evidence that it is relative economic status that leads to unplanned teenage motherhood. Our findings are complementary to those of Kearney and Levine, but our use of Gini coefficients extends the finding to the entire income as opposed to merely the lowest income decile. The overall conclusions support prior suggestions that low economic trajectory identified by Kearney and Levine (2012) is related to income inequality. This finding appears especially important in light of economic mobility trends revealed by Chetty *et al* (2017) as well as evidence of greater U.S. income inequality (Rezvani and Pirouz, 2017). Moreover, our results offer supporting evidence for the widely reported finding of complex interactions between income inequality, income levels and a number of health outcomes (Subramanian and Kawachi, 2006). Examination of the remaining coefficients in Table 2 reveals interesting results.

**Table 2** Estimated Model of Live Teen Births Per 1.000

| Live Teen Births | |
| --- | --- |
| Underage_Drinking | 0.437*** |
| | (5.07) |
| UnemplRate | 0.555** |
| | (2.87) |
| MedHHInc 1000 | 0.208* |
| | (2.53) |
| HSGradRates | -0.491*** |
| | (-6.04) |
| PovertyRates | 0.0746 |
| | (0.36) |
| Ginix100 | 0.224** |
| | (2.89) |
| White | -0.0497 |
| | (-0.35) |
| Black | 0.514 |
| | (1.84) |
| Hispanic | -2.506*** |
| | (-7.68) |
| Asian | -0.0358 |
| | (-0.57) |
| DemHS | 3.335** |
| | (2.78) |
| SplitHS | 2.140** |
| | (3.37) |
| DemGov | 1.324 |
| | (1.66) |
| OtherGov | -1.392 |
| | (-1.54) |
| _cons | 49.12** |
| | (3.46) |
| R-Sq | 0.8517 |

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The significant coefficient on the unemployment rate indicates that teen births increase by 0.555 per thousand when unemployment increases by one percentage point. Our results support Schaller's (2014) findings that unemployment rates and teen pregnancies are positively correlated.

High School graduation rates are statistically significant at the .05 confidence level, indicating that a one percentage point increase in graduation rates is associated with 0.491 fewer live teen births per 1,000. A one standard deviation, or 8 percentage point, increase in graduation rates would decrease mean live teen births by about 10 percent. This result is consistent with previous research (Tomal, 1999).

Of the four race variables included in our model – Black, White, Hispanic, Asian – only Hispanic is statistically significant at the .05 level. The coefficient on the Hispanic percent of the state population is -2.506, indicating that an increase of one percentage point in the Hispanic state population would yield 2.506 fewer live teen births per 1,000 of the population. An increase of one standard deviation in Hispanic population percentage yields about 22 fewer live teen births per 1,000. Percentage Hispanic clearly has the largest marginal effect on teen births in our model. A negative and significant coefficient for percent Hispanic may seem counter intuitive as teenage live birth rates historically were high among the Hispanic population (Yang and Gaydous, 2010). However, Kappeler (2015) reports large declines in teenage birthrates for all demographic groups, including Hispanics, through 2013. These trends could be expected to generate a negative coefficient for percent Hispanic given declining Hispanic teenage birthrates compounded by their initially high relative rates. Our results are compatible with Kearney and Levine's (2015) conclusion regarding teenagers making different choices for the period 1991-2010. Continuing those trends through 2017 could produce results that would have previously appeared anomalous. Kuka, Shenhav, and Shih (2019) find that the Deferred Action for Childhood Arrivals (DACA) program resulted in a 1.6 percent reduction in Hispanic fertility rates, eliminating roughly half of the differences in pregnancy rates between documented and undocumented teenagers. Our results are thus consistent with several recent studies and provide supporting evidence for the assertion that differences in choices made by Hispanic teenagers may have been particularly important for explaining declining teenage pregnancies.

An argument could be made for Democrats to exert either a positive or negative effect on live teen birth rates. Democrats are generally associated with easier teenage access to family planning services, a factor that would normally be expected to depress teenage birth rates. Alternatively, Democrats are also associated with more generous welfare benefits which previous literature suggests may increase live teen births. Both time variant binary choice variables for majority political party in one or both chambers of the house are statistically significant at the .05 level. DemHS = 1 if Democrats held the majority in both chambers during the time period, and = 0 if not. SplitHS = 1 if democrats have the

majority in one chamber and Republicans have majority in the other. and = 0 if power is not split. The omitted variable is Republican majority in both chambers. The coefficient on DemHS indicates that live teen births are 3.335 births per 1,000 greater when Democrats hold majority in both chambers compared to when Republicans hold majority. The second variable indicates that live teen births are 2.140 births per 1,000 greater when the power is split between two parties compared to when Republicans hold the majority. While the results are interesting, available data do not support investigation of the causal factors responsible for the political party of control effect. Data regarding availability of planned-parenthood and/or detailed state welfare expenditures under different political regimes would help to unravel these relationships. Unfortunately, necessary data are currently unavailable.

Table 3 presents estimates for the percentage of the total decline in live teen birthrate from each independent variable   Especially noteworthy in Table 3 are reduction in underage drinking which accounts for just over 22 percent of the decline, increased high school graduation which accounts for nearly 11 percent, and increases in the Hispanic population which account for 38.6 percent of the reduction. Overall variables in the model account for just over 80 percent of the total reduction in teenage birthrate.

**Table 3** Percent of Change in Live Teen Births Attributed to Variables in Model

| Variable | Reduction in Live Teen Births (%) | Increase in Live Teen Births (%) |
|---|---|---|
| Underage Drinking | 22.1 | |
| Gini Coefficient | 5.6 | |
| Median HH Income | | 3.2 |
| Unemployment Rate | 3.2 | |
| High School Grad Rate | 10.9 | |
| Hispanic % of Population | 38.6 | |
| TOTAL Percent Change | **80.4%** | **3.2%** |

## DISCUSSION

This paper was motivated by the desire to explain the substantial decline in U.S. teenage live birthrates over the period 1991-2017. Our empirical model examines the relationship between live teen birthrate, demographic variables, economic variables capturing both income levels and income inequality, and prevalence of underage drinking. An unbalanced state level panel was gathered from the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, FRED (Federal Reserve Economic Data), and the Center for Disease Control (CDC). The completed data set includes more recent observations than those used for previous studies, potentially important in light of recent demographic trends as well as teen

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behavioral changes. Moreover, the 2017 ending year for our sample extends well beyond potential anomalies attributable to the great recession.

Our most important finding relates to the impact of reduced underage drinking on declining teenage birthrates.  Decreases in underage drinking account for slightly more than 22 percent of the reduction in teenage live birthrate.  While researchers long recognize the impact of alcohol consumption on teen propensity to engage in risky sexual behavior, our results are among the first to quantify the impact of reductions in teenage drinking on teenage birthrates.  The most important demographic effect relates to the role of rising Hispanic population in reducing teenage birthrates.  This result appears to be at odds with previous evidence suggesting higher pregnancy rates among teenage Hispanic women. Our finding is consistent, however, with the work of Kappler (2105) who reports large declines in Hispanic pregnancy rates through 2013.  The positive and significant coefficient for median household income when Gini Coefficient is included in the model and insignificant effect from income when the Gini is excluded provide evidence of an interactive effect of income and income inequality.  Kearney and Levine (2012) point to lack of economic opportunity as the greatest contributor to teenage birthrates.  To test this hypothesis, Kearney and Levine (2014) employ the ratio of median income to income at the lowest decile to capture the effects of relative income and income inequality on teenage birthrate.  Our model which utilizes Gini coefficients establishes that Kearney and Levine's previous results are robust to measurement of inequality across the entire income distribution.

Our model explains slightly more than 80 percent of the 1991-2017 reduction in teenage live birth rate providing strong evidence regarding the effect on teenage birthrate from changes in demographic factors and behaviors, such as underage drinking that are only indirectly related to teen sexual behavior.  Data limitations preclude including state level targeted policy changes aimed at influencing teenage behavior in our model.  That our model explains so large a portion of teenage birthrate decline despite the omission of these targeted policies provides evidence regarding the relative ineffectiveness of these measures.  To that end our results support Kearney and Levine's (2015) conclusion "……we find little indication that recently enacted targeted policies drove much of the decline".

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# AN ANALYSIS OF COST SAVINGS FROM ELECTRONIC PAYMENTS IN HEALTHCARE

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### ABSTRACT
This paper describes the massive size of healthcare costs and presents a framework for examining the portion of those costs that arise from the processing of payments. The ACH system which is an integral part of healthcare payments processing is outlined in the paper. The authors concur with the recommendations made in earlier studies that continuing the switch from a paper-based system to a completely electronic system would not only reduce costs but also improve the efficiency of the system. Some specifics regarding the potential savings are described. Evidence regarding the progress toward fully electronic payments in healthcare is presented. By using an electronic payment system for payment of healthcare claims, huge savings can be achieved on an annual basis, as the numbers of claims processed each year are in the billions. The potential for more progress in this direction still exists.

Key Words: Healthcare, Cost savings, Electronic payments, ACH Transactions

## INTRODUCTION

Healthcare expenditures in the U.S. have been increasing not only in dollar terms but also as a percentage of GDP (Gross Domestic Product) since 1960. They have reached very high proportions over about the last decade. Tables 1 and 2 highlight the seriousness of this problematic long-term trend.

**Table 1: Healthcare Expenses [HCE] as a Percent of GDP: Long-Term View**

| Year | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 | 2017 |
|---|---|---|---|---|---|---|---|
| HCE % of GDP | 5.0% | 6.9% | 8.9% | 12.1% | 13.4% | 17.3% | 17.9% |

Source: Adapted from National Health Expenditure Data: Historical, by U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services, 2017, retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/ NationalHealthAccountsHistorical.html.

In 1960, healthcare expenditures were 5.0% of GDP, in 2010 they were 17.3% of GDP, and in 2017 they were 17.9% of GDP. This indicates that healthcare expenditures are growing at a faster rate than the GDP growth rate for the same time period. Average annual GDP growth rate for the period 1960–2010 was been 6.7% in nominal terms and the average annual healthcare-expenditure growth rate for the same period was 9.4% in nominal terms. With the exception of the period 2011-2013 and the year 2017, percentage growth in healthcare expenditures has outpaced the GDP growth rate. Over the period 2014-2016 the growth rate in GDP averaged 3.7% while the growth rate in healthcare expenditures averaged 5.3%. Over the period 2018 – 2027, healthcare spending in the U.S. is expected to grow at an average rate of 5.5% per year, which will be .8 percentage point faster than the expected growth rate in GDP over the same period leading to the forecast that healthcare expenses will make up 19.4% of GDP in 2027.

**Table 2: Healthcare Expenses, GDP, HCE as a Percent of GDP 2001–2017, Projected 2027**

| Year | GDP (in trillions of $) | Healthcare expenses (in trillions of $) | HCE as a % of GDP |
|---|---|---|---|
| 2001 | 10.6 | 1.5 | 14.0% |
| 2002 | 11.0 | 1.6 | 14.9% |
| 2003 | 11.5 | 1.8 | 15.4% |
| 2004 | 12.2 | 1.9 | 15.5% |
| 2005 | 13.0 | 2.0 | 15.5% |
| 2006 | 13.8 | 2.2 | 15.6% |
| 2007 | 14.5 | 2.3 | 15.9% |
| 2008 | 14.7 | 2.4 | 16.3% |
| 2009 | 14.4 | 2.5 | 17.3% |
| 2010 | 15.0 | 2.6 | 17.3% |
| 2011 | 15.5 | 2.7 | 17.3% |
| 2012 | 16.2 | 2.8 | 17.3% |
| 2013 | 16.8 | 2.9 | 17.2% |
| 2014 | 17.5 | 3.0 | 17.3% |
| 2015 | 18.2 | 3.2 | 17.6% |
| 2016 | 18.7 | 3.4 | 18.0% |
| 2017 | 19.5 | 3.5 | 17.9% |
| 2027* | 30.9* | 6.0* | 19.4%* |

Source: Adapted from National Health Expenditure Data: Historical, by U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services, 2017, retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-andReports/NationalHealthExpendData/ NationalHealthAccountsHistorical.html.   Note: * indicates estimate

For the l7 year period, (2001–2017), the average annual GDP growth rate was approximately 3.7%, and the average annual growth rate in healthcare expenditures was much higher, at approximately 5.1%. Also, Table 3 indicates that the healthcare expenditures for the U.S. have constituted about between about one third and one half of the global healthcare expenditures over that 17 years, whereas the U.S. only makes up about 4.5% of the world population. That percentage has been slowly declining from 4.6% in 2001 to 4.3% in 2017(www.worldometers.info/world-population), while the U.S. percentage of global healthcare expenditures has also been declining. That percentage is still disproportionately large, however.

These factors indicate that healthcare expenditures in the U.S. continue to need to be moderated. Policymakers, academicians, economists, and healthcare consultants agree that healthcare costs need overhaul and containment. Such narrative comes from a variety of sources including the Congressional Budget Office (2008), the Healthcare Financial Management Association (2008), the Council for Affordable Quality Healthcare (2013, 2018a, 2018b), *Business Insider*(2018, May 9), and Aetna (2019).

### Table 3: U.S. Healthcare Expenditure as a Percent of Global Healthcare Expenditure: 2001–2010

| Year | U.S. healthcare expenses (in trillions of $) | Global healthcare expenses (in trillions of $) | U.S.HCE as a % of global HCE |
|---|---|---|---|
| 2001 | 1.5 | 3.0 | 50% |
| 2002 | 1.6 | 3.4 | 47% |
| 2003 | 1.8 | 4.0 | 45% |
| 2004 | 1.9 | 4.4 | 43% |
| 2005 | 2.0 | 4.5 | 44% |
| 2006 | 2.1 | 5.0 | 42% |
| 2007 | 2.26 | 5.6 | 40% |
| 2008 | 2.34 | 6.0 | 39% |
| 2009 | 2.5 | 6.0 | 42% |
| 2010 | 2.6 | 6.3 | 41% |
| 2011 | 2.7 | 7.4* | 36%* |
| 2012 | 2.8 | 7.6* | 37%* |
| 2013 | 2.9 | 8.2* | 35%* |
| 2014 | 3.0 | 9.0* | 33%* |
| 2015 | 3.2 | 9.3* | 34%* |
| 2016 | 3.4 | 10.1* | 34%* |
| 2017 | 3.5 | 10.8* | 32%* |

Sources: Adapted from National Health Expenditure Data: Historical, by U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services, 2017, retrieved from http://www.cms.gov/NationalHealthExpend Data/ 02_NationalHealthAccountsHistorical.asp; Global Lessons for Controlling Healthcare Costs, by P. Behner, R. Edmunds, & E. Powers, August 2011, *Strategy + Business Magazine*. Note: * Indicates estimate.

Next, we discuss the healthcare-revenue cycle and the healthcare-revenue time line. In the third section we discuss the value-chain model, which can be used to analyze healthcare-payment costs. Using the value-chain model for the healthcare sector, we analyze how healthcare-payment costs and efficiency of healthcare payments can be improved by continuing the switch from a paper-based system to an electronic system. Here, we discuss only the Automated Clearing House (ACH) payment system, which is an electronic payment system that is relevant for healthcare payments. Lastly, we present our conclusions.

## HEALTHCARE REVENUE CYCLE

The healthcare revenue cycle can be thought of as a series of activities that are associated with the generation of revenues for healthcare providers. It is a highly complex process with numerous participants providing various services to individuals who can be thought of as the ultimate customers. Figure 1 provides an overall view of the process and its participants. The activities associated with the process can be broadly classified into three areas: preservice, management of care, and post-discharge. LeCuyer and Singhal (2007) provided an estimate of the aggregate number of transactions that take place at each stage for each activity shown in Figure 1 for the year 2006.
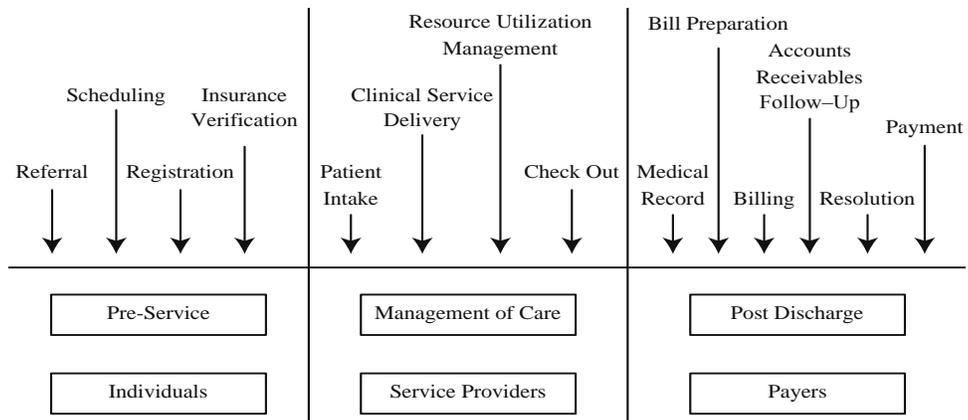


**Figure 1: Healthcare Revenue Time Line**

Source: (Modified from) Muller, Ralph. W., "Transforming Hospitals Through Reform of the Care Process" in Engineering a Learning Healthcare System: A Look at the Future, Eds. Grossmann, Claudia., Goolsby, Alexander.W., Olsen, Leigh, Ann., and McGinnis, Michael. J. The National Academic Press, 2011.

Table 4 shows an estimate of the number of transactions (in billions) that take place annually, and Table 4A shows the actual volume of ACH healthcare transactions.

**Table 4: Estimated Transaction Volume between Healthcare Providers and Payers: 2006 Estimate**

| Type of Transaction | Annual Transactions (In Billions) | % of Annual Transactions That Are Electronic |
|---|---|---|
| Eligibility Verification | 1.4–3.5 | 30–50 |
| Referrals/pre-authorization | 0.6–1.6 | 10–25 |
| Claim Submission | 4.4–7.2 | 40–60 |
| Claim status Check | 0.7–2.4 | 30–50 |
| Claim Remittance | 1.2–3.4 | 40–60 |
| Total* | 8.3–18.1* | |

* The total does not include 3 billion pharmacy claims, 7 billion clinical-lab and pharmacy orders, 4 billion patient-to-provider payments, and 1 billion government-to-provider payments. Source: Adapted from Overhauling U.S. Healthcare Payment System, by Nick A. LeCuyer & Shubram Singhal, June 2007, *The McKinsey Quarterly.*

**Table 4A: Heathcare ACH (Automated Clearing House) Transactions Volume**

| Year | Healthcare ACH Transactions Volume (in millions) |
|---|---|
| 2018 | 306.8 |
| 2017 | 275.0 |
| 2016 | 241.8 |
| 2015 | 207.7 |
| 2014 | 149.3 |

Source*: Healthcare ACH Statistics,* National Automated Clearing House Association, 2019a, Herndon, VA.

The analysis is conducted at each step in the healthcare-revenue cycle in an effort to reduce the overall expenditures of the healthcare system in the United States. Obviously, given the total value of the expenditures, the cost savings, if achieved, would be on the order of hundreds of billions of dollars, even if only considering one particular part of the revenue cycle, namely the *payment process*. The Congressional Budget office (CBO, 2008) has estimated that a cost of $300 billion per year is incurred by administrative costs by healthcare providers and public and private payers. LeCuyer and Singhal (2007) and Pellathy and Singhal (2010) indicated that the U.S. healthcare-payment system that processes more than $2.5 trillion a year is quite "inefficient" by consuming 15% of each dollar spent in healthcare compared to 2% for the payment processing incurred by the retail industry. Healthcare payments are compared with the retail industry because of relatively similar values of total payments processed. The retail industry processes $9 trillion and healthcare processes $2.5 trillion.  The main reason for the lower cost in retail is the high rate of electronic-payment processing used by the retail industry. The high administrative costs incurred by healthcare providers is attributed mainly to burdensome paperwork that requires manual handling of documents for claim processing, record keeping, and payments processing. Even after taking into account the complexity of the healthcare system, savings by the healthcare-payment system would be enormous by adopting a much higher rate of electronic-payment processing. Similar recommendations are advocated by researchers who have studied the problem (Pellathy & Singhal, 2010). In recent years, some large providers and payers have derived significant savings by using electronic submission and auto-adjudication of claims, which has resulted in the shortening of the process cycle. These savings have only occurred on a small scale and a majority of claims processing, payments processing, and payments still use paper-based systems, although Table 4A indicates that ACH processing of healthcare payments is increasing rapidly. All these systems have to comply with numerous federal regulations; the discussion of regulations is beyond the scope of this paper.


## VALUE-CHAIN MODEL

The value-chain model was first developed by Porter (1985) to increase the operational efficiency of private firms.  Burns (2002) discussed how these concepts can be applied to healthcare. According to Porter, a firm's competitive advantage increases due to the value the firm is able to create for its customers. This can come about in two ways: lower cost and/or increased efficiency. The value-chain model was first developed by Porter (1985) to increase the operational efficiency for equivalent benefits or a special benefit that justifies a higher price. The value-chain model breaks down a firm into relevant value-added activities or processes in an effort to better understand the structure of underlying costs and benefits. These processes enable the firm to strategically analyze the value-added activities and processes to reduce costs or increase efficiency, or both. Figure 2 shows a firm

conceptualized as a collection of value-added activities like inbound logistics and operations. The vertical columns at the bottom of the figure indicate value-added processes; horizontal blocks at the top of the diagram indicate support functions. Each of these value-added activities can then be analyzed, and based on this analysis, new procedures and processes could be developed, or existing ones modified to reduce costs or increase efficiency, or both. This type of analysis can be completed in the healthcare sector as well.

| | | | | |
|---|---|---|---|---|
| Firm Infrastructure | | | | |
| Human Resources Management | | | | |
| Technology Development | | | | |
| Procurement | | | | |
| Inbound Logistics | Operations | Outbound Logistics | Marketing and Sales | Service |
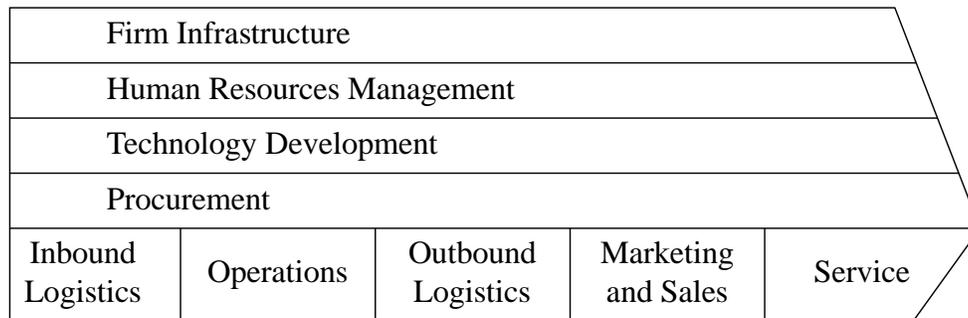
**Figure 2: The Value Chain Model**

Source: *Competitive Advantage: Creating and Sustaining Superior Performance,* by Michael E. Porter, 1999, New York, NY: The Free Press.

## VALUE CHAIN MODEL FOR HEALTHCARE PROVIDERS

Exhibit 7 shows how the value-chain model can be applied to the healthcare industry. For example, each of the activities shown in Figure 1 can be analyzed to reduce costs or improve efficiency, or both. Basically, individuals receive services from healthcare providers and healthcare providers receive payments for their services from payers like health-insurance companies, nonprofit organizations, government, and individuals. Healthcare providers also have a complex web of relationships with a host of other related service: providers like clinical laboratories, the pharmaceutical industry, healthcare equipment manufacturers, payers, etc. Table 4 shows various types of transactions that are associated with the complex web of relationships. These transactions are generally very large in scale and are on the order of billions of dollars for each type. Economic consultants have shown that converting these billions of transactions from paper-based systems to electronic systems can substantially reduce costs, increase efficiency, and dramatically reduce the scope for overbilling and other types of fraudulent claims (Trautman, Lisi, and Mayerick, 2010). In the next section we focus on cost reductions and improved efficiency that result from the implementation of electronic payments.
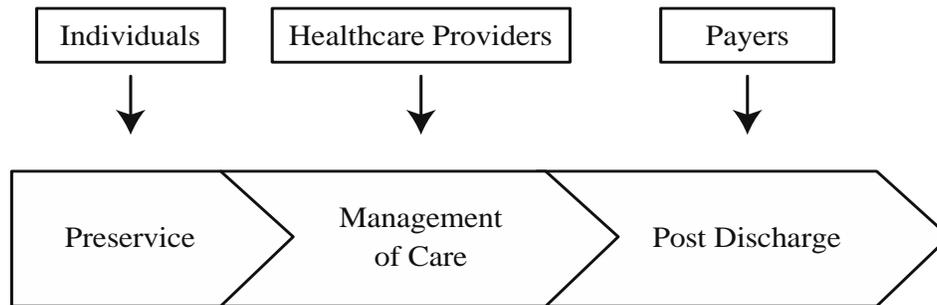
**Figure 3: Healthcare Value Chain Model**

Source: Adapted from *The Health Care Value Chain: Producers, Purchasers and Providers,* by Lawton R. Burns and Wharton School Colleagues, 2002, San Francisco, CA: Jossey-Bass.

## ELECTRONIC PAYMENTS

The most widely used electronic-payment system in the United States is the ACH network, also referred to as the electronic funds transfer (EFT) system. There are three electronic-funds transfer systems in the United States. The other two, Fedwire and CHIPS, are not suitable for healthcare payments, as they address large-value payments and are more expensive to use. ACH is a low-value and high volume payment system.  Electronic payments have had a high rate of adoption in recent years in the areas of employee payroll, consumer bill payments, and federal or state government payments. The ACH system is a flexible system and accepts a variety of formats for different types of transactions.

Two formats that have been standardized for healthcare payments are Corporate Credit or Debit Plus Addendum (CCD+) and Corporate Trade Exchange (CTX) formats. CCD+ format is designed for the transfer of funds within or between firms. Only a limited amount of remittance information can be sent using this format. The addenda record is 94 characters long and includes 80 characters of descriptive data. The CTX format is designed for company-to-company trade payments. It consists of a standard ACH transaction and a variable-length message addendum designed to include remittance information in the ASC X12 data standard. The addendum can accommodate 9,999 records of 80 characters each. CTX is used for payments related to multiple invoices and those with a considerable amount of invoice detail.

Apart from ACH, American National Standards Institute (ANSI) ASC X12 837 format can be used for electronically submitting healthcare claims by the providers in the context of electronic data interchange. ANSI ASC X12 835 format is used

for electronic remittance advice (ERA) by the payer. In this case, CCD+ format is used to transfer funds. Combined ERA and EFT can be completed using CTX format and also CTX can be used for payment on multiple claims. Pilot studies in 2011 by NACHA (2011c) showed an estimated total savings of $11 billion to $30 billion per year by switching from paper-based payment system to a completely electronic-payment system. The cost of processing paper-based checks per claim was estimated at $0.21 whereas using EFT the cost was estimated at $0.019 per claim. According to the pilot study, the estimated cost of paying 145 million claims using paper-based system was $30.7 million, whereas the cost of paying 145 million claims using electronic system was $2.7 million. In addition to the direct cost savings, the average time taken for claim processing is reduced from 49 days for the paper-based system to 14 days for the electronic system and the electronic system allows for consolidation of claims.

## SOME HISTORY OF THE AUTOMATED CLEARING HOUSE (ACH) SYSTEM

The ACH first was established in 1972 to provide an alternative to paper checks and to simplify the processing of paperless check transactions. In 1974, the National Automated Clearing House Association (NACHA) was established in order to develop a national ACH electronic network. By 1978, the United States had a nationwide ACH electronic network that was capable of transferring funds between accounts electronically. The ACH network was set up as partially privately owned and partially owned by the Federal Reserve. The ACH network is an all-electronic-funds-transfer payment system that is used by more than 14,000 financial institutions, more than 3.5 million businesses, and more than 150 million consumers to make or receive EFTs. Table 5 shows that in 2010, 19.4 billion transactions were made with a value of over $38 trillion using the ACH network. The volume and value of transactions have shown a continuing pattern of increase through 2018 with 28.5 billion transactions with a total value of $64.16 trillion.

Today, approximately 85% of ACH transactions are handled by the Federal Reserve, and the pattern of increase in transaction volume and value of transactions has generally continued. In 2015, ACH transaction volume grew to more than 24 billion electronic payments worth more than $41.6 trillion (NACHA, April 14, 2016) while in 2016 ACH transaction volume grew to more than 25 billion payments worth $43.7 trillion (NACHA, April 12, 2017). In 2017 more than 21.5 billion transactions valued at over $46.8 trillion occurred (NACHA, April 9, 2018), and, in 2018, the transaction volume was over 23 billion transactions totaling over $51 trillion occurred (NACHA, 2019b).

Figure 4 shows the various participants associated with an EFT.

**Table 5: ACH (Automated Clearing House) Annual Transaction Volume
and Total Value of Transactions 2001–2018**

| Year | Transaction volume (in billions) | Total Value of transactions (in $ trillions) |
|------|----------------------------------|----------------------------------------------|
| 2018 | 23* (28.5**) [5.6***] | 51.2* (64.16**) [12.9***] |
| 2017 | 21.5* | 46.8* |
| 2016 | 20.3* | 43.0* |
| 2015 | 19.3* (23.9**) [4.6***] | 41.6* (52.08**) [10.44***] |
| 2014 | 18.3* | 40.0* |
| 2013 | 17.6* | 38.75* |
| 2012 | 16.8* (20.7**) [4.0***] | 36.9* (46.15**) [9.28***] |
| 2011 | 15.99* | 35.06* |
| 2010 | 19.4 | 38.7 |
| 2009 | 19.1 | 37.2 |
| 2008 | 18.2 | 38.8 |
| 2007 | 18.0 | 36.6 |
| 2006 | 16.0 | 34.1 |
| 2005 | 14.0 | 31.1 |
| 2004 | 12.0 | 28.6 |
| 2003 | 10.0 | 27.4 |
| 2002 | 8.9 | 24.4 |
| 2001 | 8.0 | 22.2 |

Sources: *ACH Primer for Healthcare,* by National Automated Clearing House Association, 2013, Herndon, VA; "Adoption of EFT and ERA by Health Plans and Providers" (White Paper), by National Automated Clearing House Association, 2011a, Herndon, VA; *Healthcare Reform: Administrative Simplification and Healthcare Payments,* by National Automated Clearing House Association, 2011b, Herndon, VA; *ACH Statistics and Federal Reserve Payment Study*, National Automated Clearing House Association, 2019a, Herndon, VA.

(*) These figures exclude on-us transactions by the financial institutions.
(**) These figures include on-us transactions and are compatible with figures from 2001 – 2010.
[***] These figures are on-us transactions by the financial institutions.

| Originator | → | ODFI | → | ACH Operator(s) | → | RDFI | → | Receiver |

The direction of the flow of funds in a credit transaction

→

The direction of the flow of funds in a debit transaction

←
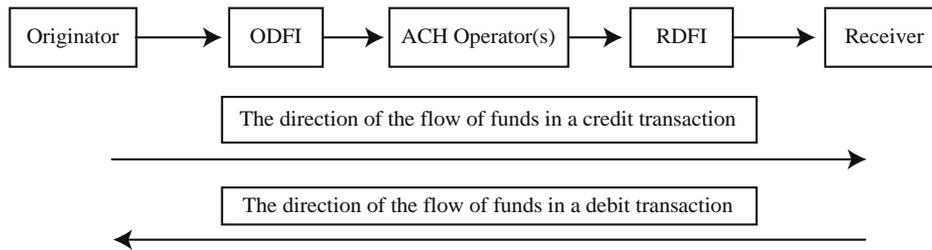
**Figure 4: ACH Network Participants**

*Note:* ODFI = originating depository financial institution; RDFI = receiving depository financial institution

The main participants in EFTs are the originator, the originating depository financial institution, the ACH operator(s), the receiving depository financial institution, and the receiver. NACHA operating rules provide the legal framework for effecting transactions through the ACH network and establish the responsibilities, liabilities, and warranties for various participants. The ACH is a high-volume low-value EFT system. Normally, it takes 2 to 3 days to complete a transfer. The ACH system is a credit and debit batch processing system. Financial institutions accumulate ACH transactions and send them to the ACH operator at predetermined times, rather than processing each transaction separately. The ACH system is able to process credit and debit transactions and fund transfers. Messages can be transmitted using appropriate formats. In a credit transaction, the originator initiates a funds transfer and the funds are transferred from the originator's account to the receiver's account. In a debit transaction, funds flow from the receiver's account to the originator's account. In this case, it is necessary to get preauthorization from the receiver. Figure 4 shows the direction of the flow of funds for both credit and debit transactions.

The ACH system has the capability to process healthcare payments efficiently, both in terms of time and cost. Currently, NACHA's primary role is to develop and maintain NACHA operating rules to promote the growth in ACH volume and to provide electronic solutions to improve the payment system. Their latest, continuing project has been to promote electronic payments in the healthcare industry, and some success has been achieved, although more improvement can be made. In 2014, healthcare EFT transaction volume via ACH exceeded 149 million with a value of $876.6 billion. Estimated savings of almost $2 per transaction as compared to paper checks that year resulted in approximate savings to the healthcare industry of over $295 million. (NACHA, February 11, 2015). A big catalyst for this progress was due to the Affordable Care Act providing for a new healthcare EFT standard, the ACH CCD+ to take effect in January 2014 in order to relieve some of the burden placed on providers who prior to that time had to go through a series of enrollment procedures and to whom payments were often slow due to difficulties matching all payment linkages appropriately. (HBMA, January 13, 2015). In 2017, the volume of healthcare EFTs via ACH was 275 million with

a value of $1.4 trillion (NACHA, 2018). In 2018 the healthcare EFT volume was 306.7 million with a value of $1.59 trillion with a potential of increased cost savings of $450 million per year if the remaining claims that are being handled manually were converted to ACH. (PMTS, 2019, January 17). Another favorable factor was an ACH Rules change in May 2015 that allowed for the Same Day processing and settlement of almost any ACH payment. (NACHA, 2019, April 20). As of 2018, the annual volume of Same Day ACH transactions was 171.9 million (132% increase from the previous year) with a value of $159.9 billion (83% increase from the previous year). (NACHA, 2019c) The Same Day rules continue to be enhanced. In September 2019, funds from Same Day transactions were made available earlier in the day, and in March 2020, the ACH dollar limit per transaction will quadruple to $100,000. In March 2021, the time window that same-day ACH payments can be submitted to the ACH Network will be extended by two hours. The motivations for increased electronic handling of healthcare payments continue to expand.

**CONCLUSIONS**

In this paper, we described a framework for addressing healthcare costs and described the payment system associated with healthcare payments. We concur with the recommendation of continuing the switch from a paper-based system to an electronic system, because it would not only reduce costs but also improve the efficiency of the system. By using an electronic-payment system for payment of healthcare claims, huge savings can be obtained on an annual basis, as the number of claims processed each year number in the billions.

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# THE 2012 LONDON OLYMPICS AND ITS EFFECT ON THE SPONSOR COMPANIES' STOCK PRICES

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## ABSTRACT

Will a global sporting event positively affect the market? Can sponsor companies expect an increase in their stock price? This study tests the semi-strong form market efficiency theory by analysing the stock prices of 16 selected companies that were official sponsors for the London 2012 Olympic Games. This study uses the risk-adjusted event study methodology to test the hypothesis that the risk adjusted return of the stock price of the sample of 16 sponsor companies is significantly positively affected by this type of information on the event date. The evidence shows that the firms experienced positive gains to their stock price leading up to the event date, and little movement days after, confirming the semi strong form market efficiency theory. This being that no investor should be able to gain abnormal returns by using past information, when adjusting for risk, since the market has already incorporated it into the price.

Key Words:  market, efficiency, Olympics, sponsorship, stock, price

## INTRODUCTION

"The Efficient Market Hypothesis is in essence an extension of the zero profit competitive equilibrium condition from the certainty world of classical price theory to the dynamic behaviour of prices in speculative markets under conditions of uncertainty." (Jensen, 1978). While the definition of this theory has been defined in many ways, the simplest way to state it is: a market is efficient if it is impossible to earn above normal profits using public information, since at any given time, a company's stock price will fully reflect all publicly available information. This concept was originally expressed by Eugene Fama in 1970.  There are three conditions according to Andrei Shleifer, that cause market efficiency (Ross). First, rationality; all investors are rational. So, when new information is released in the marketplace, all investors will adjust their estimates of stock prices in a rational way. Secondly, independent deviations from rationality; investors who are

unclear about a certain investment, due to potential lack of clarity, will act differently from one another, in the form of being either overly optimistic, or pessimistic. If there are the same number of individuals in each category, prices would react in a manner consistent with market efficiency. Thirdly, there is arbitrage. In a world consisting of two types of individuals, the rational professionals and the irrational amateurs, the professionals dominate the speculation of amateurs due to their calculated quantitative analysis to see if stocks are under or over-valued. If the professionals oppose the amateur's bullish hunches, then markets would still be efficient (Ross). Any one of these conditions will lead to market efficiency and hold the two implications of the theory. First, investors should never expect to gain abnormal returns if they are using the same information as the market. And second, companies are unable to fool investors to benefit from valuable financing opportunities since they will receive a fair value for securities that are selling, due to prices fully reflecting its present value (Ross).

Olympic events are ones that can have an impact on a sponsor's company's stock price, since these spectacles can cause a spike in interest for a sponsor company's products due to the huge increase in advertisement viewership. This study tests the semi-strong efficiency theory by analysing the impact the London 2012 Olympics had on the risk adjusted stock price returns of its sponsors' firms. This Olympic Game had the most watched opening ceremony in the United States history since NBC took over the broadcast contract in 2000, with 40.7 million people tuning in (O'Connell, 2016). 8.8 million tickets were sold, and its opening ceremony had an estimated 4 billion global audience (Leybovich, 2012). The sheer size of this global event is reason enough why many companies would be vying for a chance to affiliate themselves with the London Games, with 53 obtaining this role (Rogers, 2012). The Olympic Games last for 16 days, giving sponsors the chance to market and promote their products to a larger market than they do normally. Moreover, athletes competing in the Games are idols to millions of impressionable consumers around the world, thus, giving sponsor's an ideal scenario to market and sell the products that the athletes are wearing, using or promoting, making the people watching feel closer to their favourite athletes. This study looks to test that the London 2012 Olympics had a positive effect on its sponsors stock price, since research suggests this.

**PROBLEM AND PURPOSE**

There are different ways one can go about testing market efficiency: either by researching event studies that occur at a point in time, or ones that occur over a period of time, with this paper focusing on the former.

To guarantee the accuracy and validity of a test of market efficiency, an event must be chosen that can be empirically and theoretically proven to have had a quantifiable adverse or favourable effect. How does the market respond to a global event that only occurs every four years? When a global event happens, does the market adjust there and then? Or does it take time to adjust?

The global event analysed by this study is the 2012 London Olympic Games, where on July 27, 2012, its opening ceremony took place. This study examines the effect of this event on the risk adjusted stock returns of a sample of 16 sponsor companies. All sample firms are predicted to have been positively impacted by the global event, due to the increased awareness and audience for their products.

This research project hypothesizes that the chosen sponsor companies' stock prices responded positively to the opening ceremony of the 2012 London Olympic Games, thus rendering support for the semi-strong form efficient market hypothesis. This study examines the reaction of the risk-adjusted rate of return of the selected sponsor companies 30 trading days before and 30 trading days after the date of the event, defined as, July 27, 2012. The study analyses the London Olympic games to asses the benefit companies around the world receive by partnering with such an event.

**LITERATURE REVIEW**

"A market in which prices always "fully reflect" available information is called "efficient" (Fama,1970). The efficient market hypothesis identifies different types of efficiency, depending on what type of information is being used to earn a higher than normal rate of return. These are: weak form, semi-strong form, and strong form. With weak form efficiency, all past information is already incorporated in the current stock price, meaning that investors can't utilize this information to make above average returns (Ross). If markets are weak form efficient, it would brand analysing past stock information to try and extrapolate future trends in the market redundant, since the stock has already imbedded all this information in its price making technical analysis obsolete. Semi-strong form efficiency exists when stock prices correctly and quickly incorporate all publicly available information (Baim, Goukasian, Misch, 2016). This makes it impossible for investors to obtain a higher than normal return when acting on publicly known information. This type of market efficiency represents the accepted paradigm and is what is generally meant by unqualified references in the literature to the "Efficient Market Hypothesis" (Jensen, 1978). Lastly, strong form efficiency hypothesizes that the market reflects all information: past, public and private (inside) in stock prices. Therefore, it not possible for investors to attain an above normal return no matter

their level of information known, even inside information. Strong form efficiency is considered to be the least likely for how markets actually behave, as it is difficult to believe that the market is so efficient that someone with valuable inside information cannot prosper from it (Ross). Moreover, there has been empirical work published that support the notion that this type of efficiency is unlikely (Ross).

There were four different levels of sponsorship for the London Games, that resulted in a total of $2.2 billion in sponsorships (Baim, Goukasian, Misch, 2016). These four levels were: worldwide Olympic Partners, London 2012 Official Partners, London 2012 Olympic Supporters, and London 2012 Olympic Providers and Suppliers (Rogers, 2012). Each of these firms, at each level, contributed $100 million, $63 million, $31 million, and $15 million respectively (Baim, Goukasian, Misch, 2016). Previous research shows that the sponsorship companies were positively affected by the London 2012 Olympic Games. With Baim, Goukasian and Misch determining "We find that London 2012 Olympic sponsorships are associated with increased share values for major contributors and for host-country companies. More broadly, most sponsors had significant positive abnormal returns on the announcement days, indicating that investors deem the benefits of sponsorships to be at least equal to the costs…. Partner firms gain about 1% abnormal return on the announcement day" (Baim, Goukasian, Misch, 2016).

**METHODOLOGY**

The study sample includes the eighteen sponsor companies that contributed most to the London Games: the worldwide Olympic Partners and the London 2012 Official Partners, of which the firms invested $100 million, and $63 million each respective of their sponsorship level. This study will use the standard risk adjusted event study methodology in the finance literature to test the stock market's response to the July 27, 2012 London Olympic Game Opening Ceremony event date. Yahoo! Finance was used to obtain all the data required to complete this quantitative analysis. This data includes: all past stock prices for sponsor firms, and the corresponding change in the S&P 500 during the event study period, which will be 180 trading days before the event date, and 30 trading days after.
The analysis was performed according to the following steps resulting in Figure 1:
1. The event date was obtained and said to be day 0. Past stock prices are obtained for all sponsor companies in the sample and the S&P 500 for the duration of the event study, being -180 trading days to +30 trading days.

2. The holding period returns of the companies (R) and the S&P 500 index ($R_m$) were calculated using these formulas:
   Current daily stock return= <u>(current day close price – previous day</u>
   <u>close price)</u> / previous day close price
   Current daily index return= <u>(S&P current close- S&P previous close)</u>
                                                        S&P previous close

3. A regression analysis was partaken to calculate the alpha (the intercept) and the beta (the slope of the regression line). This was completed by using the actual daily return of each company (dependent variable) and the corresponding S&P 500 index daily return (independent variable) over the course of the pre-event period, -180 days to -31 days.

4. For this study, in order to get the normal expected returns, the risk-
   adjusted method (market model) was used. The expected return for each day of the event period from day -30, to day +30, was calculated as:
   $E(R)$= alpha+Beta ($R_m$) Where $R_m$ is the return on the market, i.e. the
   S&P 500 index.

5. The, the Excess return (ER) is calculated as: ER= the Actual Return (R) – Expected Return E(R)

6. Average Excess Returns (AER) is calculated (for each day from -30 to
   +30) by averaging the excess returns for all the firms for a given day.
   AER = Sum of Excess Return for given day / n,
   Where n = number of firms in sample

7. Cumulative AER (CAER) is calculated by adding the AERs for each day from −30 to +30.

8. Graphs of AER and Cumulative AER are plotted for the event period i.e. day -30 to day +30

To test semi-strong market efficiency with respect to the opening ceremony event of the London Olympic Games, this study propositions the following null and alternate hypotheses:

**Figure 1**

| Firm Name | Symbol | Alpha | Beta |
|---|---|---|---|
| Coca-Cola | KO | 0.000748597 | 0.536185595 |
| Acer | ACER | -0.004150437 | 0.662405273 |
| Atos Origin | ATO.PA | 0.00173451 | 0.099711693 |
| General Electric | GE | 0.000971424 | 1.105754258 |
| Dow Chemical | DWDP | 0.000541387 | 1.558895127 |
| McDonald's | MCD | -0.000461358 | 0.500106729 |
| Omega | OHI | 0.001196963 | 1.185032101 |
| Panasonic | PCRFY | -0.002135281 | 1.074293003 |
| Procter & Gamble | PG | -9.99928E-05 | 0.459280394 |
| Visa | V | 0.001402676 | 0.860609613 |
| Adidas | ADDYY | 6.7749E-05 | 1.508470955 |
| BMW | BMWYY | -0.000820345 | 1.997376874 |
| BP | BP | -0.00095279 | 1.194401466 |
| BT | BT | 0.000120343 | 1.220426447 |
| EDF Energy | ECIFY | -0.002730534 | 1.66101043 |
| Lloyds TSB | LYG | -0.000251531 | 2.445475119 |

$H1_o$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is not significantly affected by this type of information on the event date.

$H1_1$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is significantly positively affected by this type of information on the event date.

$H2_0$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is not significantly affected around the event date as defined by the event period.

$H2_1$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is significantly positively affected around the event date as defined by the event period.

## QUANTITATIVE TESTS AND RESULTS

Were the London 2012 Olympic Sponsors' company's risk-adjusted stock prices returns positively affected by the global event? If so, does this mean the market reacted to the opening ceremony on July 27, 2012? After calculating the Average Excess Returns (AER) from – day 30 to +30, the Cumulative Excess Returns were obtained by adding the AERs for each day from -30 to +30. When analysing the Average Cumulative Excess Returns (CAER) in the graph below, we see that the returns exponentially increase at day -12. Then they level off from day -10 to day -5, before gradually decreasing back down until day +12. At day zero, you can observe that the excess returns have peaked for the lead up to the event date, with returns decreasing for the whole duration of the Olympic Games, before picking back up after they concluded. Therefore, inferring that the market had already imbedded the information into the stock prices of the sponsors' companies by the event date of July 27, 2012, thus supporting semi-strong form efficiency, presented by Eugene Fama.

**Figure 2. AER of 16 Sponsor Companies vs Event Period**
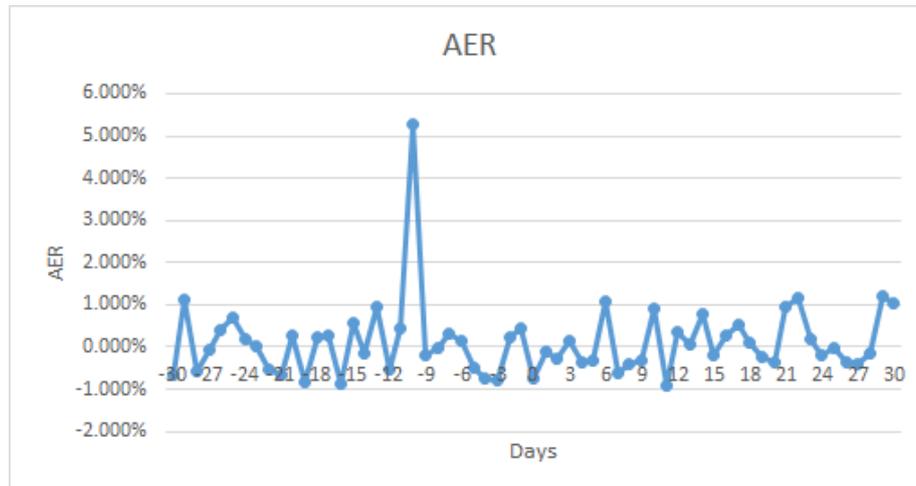
**Figure 3. CAER of 16 Sponsor Companies vs Event Period**
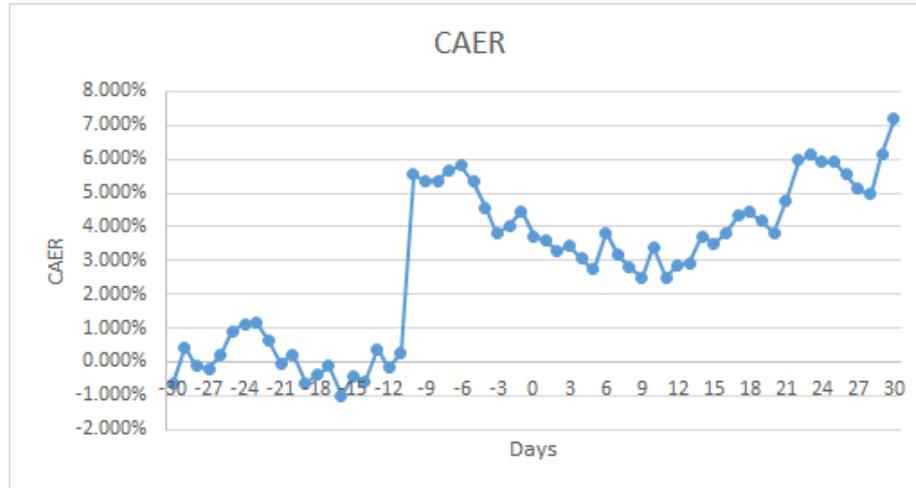


To statistically test for a difference between these two types of risk adjusted average excess returns for the 16 sponsor companies, a paired t-test was utilized, leading to significant evidence, at the 0.05 level. Consequently, supporting the alternative hypotheses $H1_1$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is significantly positively affected by this type of information on the event date as well as $H2_1$: The risk adjusted return of the stock price of the sample of 16 sponsor companies is significantly positively affected around the event date as defined by the event period.

**CONCLUSION**

The purpose of this event study was to test market efficiency and determine whether the 2012 London Olympic Games had a positive risk adjusted rate of return for the 16 selected sponsor companies. Evidence shows an increase in risk-adjusted returns for the sample in the lead up to the event date (day 0), but then staying constant for the duration of the Games. Therefore, the study supports semi-strong form market efficiency as the market anticipated the gains on those sponsors of the Olympic Games, and if an investor acted upon this information, no above normal returns could have been obtained. These results support the study hypotheses. Results here give companies who are thinking about becoming sponsors for future Olympic Games more information, allowing them to make more informed investment decisions.

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# BLOCKCHAIN: AN EMPIRICAL REVIEW OF *FORTUNE 500* WEBSITE POSTINGS AND USAGE

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*ABSTRACT*

Blockchain technology, the foundation for Bitcoin, is one of the newest developments in information systems. Because of its substantial potential benefits, especially regarding transaction security, this empirical study was conducted to investigate blockchain usage at the largest firms, the Fortune 500. A review of the firms' webpages found that while only four percent of the Fortune 500 describe usage, 20% of the Fortune 100 do so. Firms are primarily in the financial or technology sectors with commercial banking being the most common industry. A content analysis further reveals more than half of firms either using blockchain technology for internal applications or building blockchain networks and that there are five firms with extensive coverage. Results suggest that there may be considerable competitive market advantages available.

Keywords: Blockchain, Fortune 500, empirical study

## INTRODUCTION

Gartner forecasts that blockchain technology will create more than $176 billion dollars of business value by 2025 and $3.1 trillion by 2030 (Costello, 2019). This is consistent with PwC's 2018 survey of 600 executives from 15 territories in which 84% indicated their organizations have at least some involvement with blockchain technology (Davies and Likens, 2019). The survey found that 20% of firms are in the research phase while 32% are in development. However, only 15% are live with the biggest barriers to adoption being regulatory uncertainty (48% of respondents) and lack of trust (45% of respondents).

To gain greater insights into the overall attitudes and investments in blockchain as a technology, Deloitte polled a sample of 1,386 senior executives in 12 countries during February 8 and March 4, 2019 (Pawczuk, Massey, & Holdowsky, 2019). The survey found 53% indicating that blockchain technology has become a critical priority for their organizations in 2019 and 77% indicating that they will lose a competitive advantage if they do not adopt blockchain technology. The survey also found that 40% of these firms plan to

invest $5 million or more in new blockchain initiatives over the next 12 months.

## BLOCKCHAIN

Satoshi Nakamoto is credited with conceptualizing and coining the term "blockchain" in a whitepaper in 2009 (Goyal, 2018). Little is known about Nakamoto as he could be a person or a group of people that worked on Bitcoin, the first application of the digital ledger technology. Blockchain has been described as a decentralized ledger, or list, of all transactions across a peer-to-peer network (Garfinkel and Drane, 2016). Using this technology, buyers and sellers can transfer value (or assets) across the Internet without the need for a verification by a trusted central third-party. Assets can be tangible such as cash and a house or can be intangible such as patents and copyrights. Bitcoin, a digital currency launched in 2009, is just one example of such an asset (Davis, 2011). Bitcoin (2019) is built upon the foundation of blockchain which serves as its shared public ledger. Because records are immutable, trust is created in that they represent a shared record of the truth.

A blockchain network has the following key characteristics (Gupta, 2017):
- Consensus: For a transaction to be valid, all participants must agree on its validity.
- Provenance: Participants know where the asset came from and how its ownership has changed over time.
- Immutability: No participant can tamper with a transaction after it has been recorded to the ledger. If a transaction is in error, a new transaction must be used to reverse the error, and both transactions are then visible.
- Finality: A single, shared ledger provides one place to go to determine the ownership of an asset or the completion of a transaction.

The Blockchain Research Institute (BRI), an independent global think-tank co-founded by Don and Alex Tapscott, investigates blockchain technology. The institute is funded by a membership consisting of more than 60 international corporations and government agencies such as P&G, KPMG, Tata, Tencent, and so on. The organization brings together global researchers to undertake ground-breaking research on blockchain technology and is founded on 100+ projects documenting the strategic implications of blockchain on business, government, and society. In addition, universities such as Stanford (2019), Arizona State (2019), and MIT (2019) have created centers and programs for blockchain research.

## PREVIOUS RESEARCH

Miau and Yang (2018) utilized the bibliometrics approach to examine blockchain technology research articles from 2008 to March 2017. Results from the analysis of 801 articles retrieved from the Scopus database found three stages of blockchain research. In 2008 to 2013, the topics were related to the Bitcoin and cryptocurrencies; in 2014 to 2015, the number of Bitcoin literatures grew rapidly; and, after 2016, researchers were studying the techniques of blockchain and smart contracts.

Yli-Huumo, et.al (2016) further examined research papers found in scientific databases. The results from the extracted 41 papers show that the focus in over 80% of the papers was on the Bitcoin system with less than 20% dealing with other blockchain applications such as smart contracts and licensing. Although the researchers found most of the research focused on revealing and improving the limitations of blockchain from privacy and security perspectives, many of the proposed solutions lacked concrete evaluation on their effectiveness.

da Silva Momo, et.al, (2019) used the Crunchbase database, an international repository created to maintain the record of the 100,000 most innovative companies in the world, to identify the characteristics of innovative business models using blockchain technology. A sample of 810 companies found a variety of business models including: the intermediation of sale and purchase of cryptocurrencies, as well as offering wallets to store these assets; applications and services related to economy, business and agriculture such as smart contracts, promotion of collaborative consumption, crowdfunding, credit services, financial services in general, futures contracts, trading platforms, fraud detection, and food tracking/transport; arts dealing with the registration of copyright; education, which offer courses related to blockchain; energy; sports/games; government with the search for better data protection and providing services to population, control of expenses, and prevention of corruption; health, which involves clinical tests, diabetes, health care, and science of life; and, the application in the social area that is related to non-governmental organizations, associations, social projects, sustainability, and crowdfunding.

Although prior research has examined stages of blockchain research, scientific publication research, and the business models of innovation companies, little or no research has been conducted investigating the largest corporations, the *Fortune 500*. As a result, this research was conducted to examine several questions. Do the *Fortune 500* firms provide information about their blockchain efforts on their webpage(s)? Is firm size a factor? What sectors and industries are most active? Finally, what are the specific uses detailed on the websites? Results are important in providing a foundation for blockchain study in these important firms and determining if competitive advantages are possible.

**RESEARCH DESIGN**
This study used the *Fortune* magazine website to obtain the *Fortune 500* company directory and the corresponding company home page web address (2019). A two-step process was utilized to locate blockchain references for each organization in November of 2019 (Figure 1). First, each company home page was examined for any reference to the term "blockchain." Next, if the term was not found on the home page, the home page's search engine was utilized to search for the term. Resultant data was analyzed by organization size, sector, and industry. A content analysis of the posted information was then conducted to examine each firm's use of the blockchain technology.

Company Home Page
↓
Company Website
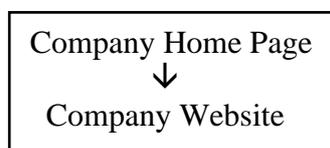
**FIGURE 1. Research Methodology**

**RESULTS**

A review of the *Fortune 500* firms found that 21, or four percent, of these firms have a reference to the use of blockchain technology posted on their website. In terms of location, none of the firms have a reference located on the company home page and four percent of the *Fortune 500* have the information located on another web page (Chart 1).

**CHART 1**
**Privacy Policy Website Location**
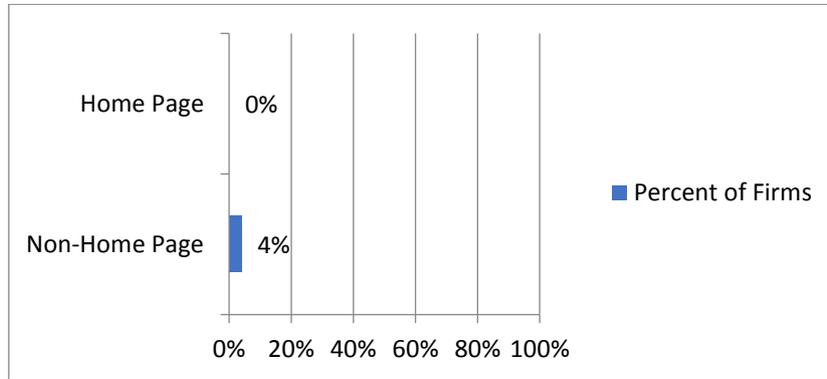


In terms of firm size, as depicted in Table 1, 12 of the firms using the term "blockchain" are in the *Fortune 50*, eight firms are in the *Fortune* 51-100, and one firm is in the *Fortune* 401-450. Overall, 24% of the *Fortune 50* and 20% of *Fortune 100* listed the term.

**TABLE 1**
**Blockchain Usage and Firm Size**

| Firm Size Category | Number of Firms | Percent of Category |
|---|---|---|
| *Fortune* 1-50 | 12 | 24% |
| *Fortune* 51-100 | 8 | 16% |
| *Fortune* 101-150 | 0 | 0% |
| *Fortune* 151-200 | 0 | 0% |
| *Fortune* 201-250 | 0 | 0% |
| *Fortune* 251-300 | 0 | 0% |
| *Fortune* 301-350 | 0 | 0% |
| *Fortune* 351-400 | 0 | 0% |
| *Fortune* 401-450 | 1 | 2% |
| *Fortune* 451-500 | 0 | 0% |

Blockchain firms were next examined with respect to business sector. Table 2 shows that six of the firms are in the financials sector, six are in the technology sector, two are in the health care sector, two are in the retailing sector, two are in the transportation sector, one is in the food, beverage, and tobacco sector, one is in the motor vehicles and parts sector, and one is in the telecommunications sector. Overall, 12, or 57%, of the firms are in the financials or technology sectors.

**TABLE 2**
**Blockchain Firms and Sector**

| Sector | Number of Firms |
|---|---|
| Financials | 6 |
| Technology | 6 |
| Health Care | 2 |
| Retailing | 2 |
| Transportation | 2 |
| Food, Beverage, & Tobacco | 1 |
| Motor Vehicles and Parts | 1 |
| Telecommunications | 1 |

Blockchain firms were further categorized by industry. Table 3 illustrates that five of the firms are in commercial banking, two are in computer software, and two are in mail, package, and freight delivery. The remaining firms are in a variety of industries from computers to telecommunications. Overall, five, or 24%, of the firms are in the commercial bank industry.

**TABLE 3**
**Blockchain Firms and Industry**

| Industry | Number of Firms |
|---|---|
| Commercial Bank | 5 |
| Computer Software | 2 |
| Mail, Package, and Freight Delivery | 2 |
| Computers | 1 |
| Food Production | 1 |
| General Merchandizer | 1 |
| Health Care | 1 |
| Information Technology Services | 1 |
| Insurance | 1 |
| Internet Services and Retailing | 1 |
| Motor Vehicles and Parts | 1 |
| Network and Other Communications Equipment | 1 |
| Pharmaceuticals | 1 |
| Semiconductors | 1 |
| Telecommunications | 1 |

Table 4 describes the online blockchain information for each of the firms. A review of these sites illustrates that there are five firms with extensive coverage of blockchain technology. The firms with the most webpages include IBM (2019) with 1,334,000+ webpages, Microsoft (2019) with 872,000+ webpages, Oracle (2019) with 1,000+ webpages, J.P. Morgan Chase (2019) with 400+ webpages, and Cisco (2019) with 330+ webpages. In addition, Bank of America touts that for seven consecutive years, it has been the top financial services institution on the Intellectual Property Owners Association's annual list of 300 organizations granted the most United States patents having more than 3,500 patents and applications with nearly half of their 2018 patents relating to pioneering advancements in blockchain, artificial intelligence, cybersecurity and mobile banking (Pipitone, 2019).

**TABLE 4**
**Blockchain Usage by Firm**

| *Fortune* Rank | Firm | Usage |
|---|---|---|
| 1 | Walmart | Collaborating to evaluate its use to protect pharmaceutical product integrity in its drug supply chain |
| 3 | Apple | Because gold is used in electronic components, in the Fall of 2019, Apple's supply chain will trace gold from the mine to the refiner |
| 5 | Amazon.com | Beginning April 30, 2019, Amazon Web Services Inc. announced the general availability of Amazon Managed Blockchain, a fully managed service that makes it easy to create and manage scalable blockchain networks |
| 12 | Ford | Piloting innovative geofencing and blockchain technology to ensure vehicles operate efficiently in city centre low-emission zones such as in Cologne and London using time stamped record of data to help create virtual geographic boundaries using GPS |
| 18 | JP Morgan Chase | 405 webpages. The Blockchain Center of Excellence leads efforts for Distributed Ledger Technology applications, actively researching blockchain use cases to develop in-house technology and pilot solutions across lines of business within J.P. Morgan. Connecting leading technologists, the program aims to actualize enterprise-grade blockchain tools, such as JPM Coin, Interbank Information Network® (IIN) and Quorum® to drive industry standards and deliver value to clients. |
| 25 | Bank of America | Granted most patents in financial services industry. Half of 2018 patents include |

| *Fortune* Rank | Firm | Usage |
|---|---|---|
| | | blockchain, AI, cybersecurity, and mobile banking |
| 26 | Microsoft | 872,000+ webpages. In May 2019 released Azure Blockchain Service making it easy for anyone to quickly setup and manage a blockchain network and providing a foundation for developers to build a new class of multi-party blockchain applications in the cloud. |
| 29 | Wells Fargo | Uses derivatives collateral and liquidity management platform that leverages semantic web, artificial intelligence and blockchain technologies to analyze data, facilitate post-trade operations, and manage risks |
| 32 | Comcast | Announced startups selected for the 13-week accelerator program will receive one-on-one mentoring from Techstars, a worldwide entrepreneur network that supports entrepreneurs through access to mentorship and capital |
| 38 | IBM | 1,334,000+ webpages. Describe supply chain, food trust, financial applications, and so on. |
| 41 | United Parcel Service | Used in e-commerce transactions |
| 43 | Intel | 74 webpages. Have several solutions such as Hyperledger Fabric & Transparent Supply Chain to simplify blockchain deployment. |
| 44 | MetLife | Looking to add new features such as used in e-commerce highly secure, permissioned transactions |
| 47 | FedEx | Working with Precision Software to examine areas where blockchain could improve efficiencies and create industry standards for blockchain use |
| 61 | Pfizer | Using Blockchain technology to improve provider data quality |
| 62 | Goldman Sachs | 33 webpages. Explaining blockchain and trends. |
| 63 | Morgan Stanley | Reports a meaningful uptick in the number of companies mentioning Blockchain in their earnings calls and company filings since the beginning of 2016, with 63% of those mentions in filings belonging to companies associated with capital markets |
| 64 | Cisco Systems | 332 webpages. Cisco blockchain solutions enable businesses to build trust-based networks for digital transformation. |

| *Fortune* Rank | Firm | Usage |
|---|---|---|
| 80 | Tyson Foods | Partnering with IBM to improve food safety and security in supply chain |
| 81 | Oracle | 1000+ webpages. Blockchain from Oracle securely extends client business processes and applications. |
| 404 | Quest Diagnostics | Launched a pilot program applying blockchain technology to improve data quality and reduce administrative costs associated with changes to health care provider demographic data |

A content analysis of the posted information was next performed to determine how firms are using blockchain technology. Table 5 shows that internal applications (33% of firms) and building blockchain networks (29% of firms) are the most common uses. Supply chain (14% of firms), innovation (14% of firms), and describing trends (10% of firms) were fewer common uses.

**TABLE 5**
**Blockchain Usage by Category**

| Category | Number of Firms | Percent of Total |
|---|---|---|
| Internal Applications | 7 | 33% |
| Building Blockchain Network | 6 | 29% |
| Supply Chain | 3 | 14% |
| Innovation | 3 | 14% |
| Describing Trends | 2 | 10% |

**CONCLUSIONS AND FUTURE RESEARCH**

Results show that only four percent of the *Fortune 500* are posting their blockchain technology efforts on their webpages. However, while only one firm in the *Fortune* 101-500 firm size category has posted information, 20% of the *Fortune 100* firms have blockchain coverage. In terms of webpage location, no firms posted blockchain information on their home page. Blockchain information was only accessible via the homepage search engine tool.

In terms of sector, the majority, or 57%, of firms describing blockchain are in the fintech (financials and technology) sector. Relative to industry, commercial banking accounted for five, or 24%, of these firms. A further review of each firm's descriptions of blockchain illustrates that there are five firms with extensive coverage of blockchain. These firms include IBM, Oracle, Microsoft, J.P. Morgan Chase, and Cisco. IBM, for example, posts more than 1.3 million results when "blockchain" is used in its search engine. Content analysis also reveals that 52% of the firms use blockchain technology for internal applications or building blockchain networks.

There are two important implications from the study. One finding is that even though 20% of the *Fortune 100* firms have posted blockchain information, blockchain usage and implementation may still be in the infancy technology stage given that only 21 of the top 500 firms have posted information on their webpages. These findings imply that there may be considerable first mover opportunities. It is possible that the current first movers, the largest firms, are seeking economies of scale benefits associated with their size. Or, with respect to the technology sector, these companies are hoping to gain competitive marketing advantages by offering a new line of products. However, given that five of the commercial banks have already promoted their blockchain efforts, the remaining 15 commercial banks in the *Fortune 500* may already be at a competitive disadvantage and thus may need to play catch-up.

A second implication relates to intellectual property, research and development, and marketing. At present, technology firms that create customer solutions have the most extensive blockchain search engine results. Given that blockchain technology is relatively new, it is possible that the other firms are intentionally hiding their new product plans, transitions from legacy systems, and so on in effort to gain a future competitive advantage, mask underlying infrastructure to minimize market security fear, or move in a cautious manner with the new technology. As a result, the use of blockchain may be highly underreported.

The limitations of this study are primarily a function of the nature of the research sample and methodology. Only the *Fortune 500* firms were studied. The use of additional size firms and firm locations (those outside the U.S.) would increase the robustness of results. Moreover, the research only includes webpages accessible via each firm's homepage search engine so intranet (internal) web information may not be visible or included. Therefore, the incidence of blockchain technology usage is likely higher than reported in this research. Future research is needed to explore how industry sector and firm size may affect implementation and usage. Such an analysis, for example, may be helpful in providing additional insight as to whether deficiencies or exploitable competitive advantages exist for the firm.

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# MARKETING THE LIFESTYLE OF WINE: ROLE OF AN INDUSTRY PUBLICATION

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*Abstract*
The purpose of this paper is to understand the role of Wine Spectator magazine, a well-known publication of the wine industry, in creating consumer perceptions about wine, to impact positioning and branding of the product category, and individual wine regions, wineries and wine brands. Content analysis was performed on the magazine's 15 issues of the year 2016. Findings show that the magazine creates a perception of wine consumption by engaging in lifestyle positioning. This is achieved through descriptions of various aspects of a wine centered lifestyle, and supporting that with wine and non-wine product advertisements. The magazine facilitates positioning, branding and reputation of wine origins and brands directly through creating awareness, humanizing the origin by connecting it with stories on wine makers, providing extensive expert ratings, and indirectly by inviting a considerable percentage of magazine space to wine advertisements. This research focusing on exploring usage of lifestyle positioning and branding of an industry publication is the first of its kind in the wine academic field thus laying a focused foundation. It also reinforces the importance and success of lifestyle positioning in yet another industry and provides strategic insights that wine makers can emulate.

**Keywords**
Wine positioning, wine branding, wine perception, lifestyle marketing, lifestyle branding

**Introduction**
The world of wine is changing. Over the last decade there has been a consistent increase in consumption of wine in the US and abroad, wine is fast developing a premiumization perception (Douglas, 2017; Mullen, 2018; Thach, 2017; Wehring, 2018). At the same time wine is considered by wine drinkers as a socially complex product bringing with it social risks and rewards and resulting uncertainties and dissatisfaction in the decision making process of selecting and consuming wines. This has created a desire for more information on wine from the players in the wine industry.
Positioning and branding creates a desirable perception of products and brands in consumers and help companies effectively counter market

challenges and is at the heart of long term success of a product category and brands (Eisend & Stokburger-Sauer, 2013). In their going effort to gain customer loyalty brand managers have successfully adopted a positioning based on an overall umbrella of lifestyle with its emotional and social underpinnings (Danskin, Englis, Solomon, Goldsmsith, & Davey, 2005). This has been particularly true in product categories that are difficult for consumers to evaluate such as food and fashion products and where little technical differentiation is possible. Lifestyle positioning allows brands to become a more intimate part of a consumers' life facilitating a close bond between the product and the consumer (Chernev, Hamilton, & Gal, 2011).

Major industry publications play an important role in promoting that industry. They collect, collate and share news about the industry to inform and educate their readers. The kind and extent of information, and style of presentation impacts perceptions and reputations of the industry and brands. This promotion if done well is critical for long term success of the industry and the individual brands that are part of that industry as well as that of the publication itself. Major industry publications also play a part in promoting individual brands through paid advertisements. This collaborative and beneficial role takes on added importance for a fast growing and dynamic credence, experiential and socially complex product such as wine. Analysis of the contents of a leading publication from the wine world with the goal of understanding what kind of positioning strategies and tactics it is utilizing including lifestyle positioning, in promoting and creating perceptions in the minds of the consumers, and how, should provide a view into the magazine's role and impact on industry. A research of this kind is an attempt for the first time in the wine world in the context of lifestyle positioning. It should act as a precedent for similar research in the future in other industries.

This paper content analyzes Wine Spectator magazine (a premier publication for the wine industry) to determine how the magazine creates perception of wine through positioning of the product wine and its brands. The Luxury Institute ranked Wine Spectator in 2008 as the number one business and consumer publication among wealthy readers (Wikipedia).

**Literature Review**

*Elements of Product Positioning and Branding*

Brand equity has long been considered important both for marketers and consumers (Aaker, 1991; Keller, 1993). Brand equity happens "when certain outcomes result from the marketing of a product and service because of its brand name that would not occur if the same product or service did not have that name" (Keller, 1993, p.1). It includes a "set of assets and (liabilities) that links to a brand name and symbol, that adds to or (subtracts from) the value provided by a product or service to a

firm or that firm's customers" (Aaker, 1991, pp. 7-8). Inability of companies to adapt to increased competition and misalignment with consumer tastes and preferences are the usual causes of brand equity deterioration (Spielman, 2014). Branding literature identifies the common brand related assets as brand awareness, brand associations and perceived quality (Fournier, 1998; Wernerfelt 1988). Beyond simply making consumers aware of the product and brand, brand positioning creates additional value through signaling quality and helping foster meaningful associations. This has been shown to be true both for simple (Red Bull energy drink) and relatively complex and expensive (North Face Parka) products (Holehonnur, Raymond, Hopkins, & Fine, 2009). Origin bound products (OBB) such as wine which cannot be separated from their origins can dip into additional assets such as a certain consumer leniency towards inconsistencies in product, perception of authenticity and loyalty to origin (Charters, 2009; Grayson & Martinec, 2004).

*Awareness, Associations and Quality Perceptions*

Greater awareness of a wine leads to higher chance of a consumer choosing that wine (Koll & Von Wallpach, 2009). To keep consumers consistently select that wine it needs to create positive associations (Santos & Ribeiro, 2012). These associations together form the identity (created by the winemaker) or image (perceived by the consumer) of the wine and together with perception of quality, form the positioning of the brand and its possible differentiation (Valette-Florence & De Barnier, 2013). An awareness of a brand and a desired brand positioning together constitute brand knowledge of the customer which is expressed as a response to the brand (Esch, Langer, Schmitt, & Geus, 2006). Effective positioning thus helps consumers engage with the product and brand through on-going meaning making activities. Weakness in promotional activities geared towards developing wine knowledge has been shown to adversely impact appreciation of Italian wines in foreign countries (Barisan, Boatto, Rosetto, & Salmaso, 2015).

The associations that can be developed as part of a brand image can lie in intrinsic (e.g aroma, taste), or extrinsic (labels, packaging, product attributes) qualities, lifestyle, personality and the benefits derived (Plummer, 2000).

Brand personality incorporates emotional and symbolic meanings that appeal to the consumer and provides additional reasons to connect with the brand (Lau & Phau 2007). Park and John (2010) found that brand personalities affect self-perception. Consumer desire to create identities through products is the reason research has found that positioning the brand in a certain way which includes certain personality traits has a stronger effect on quality evaluation than simply positioning on functional attributes (Na, Holland, Shackleton, Hwang, & Melewar, 2008). For wine, perceptions of brand personalities can be engendered

from human personification of the brand (the wine maker, the owner of the winery) and from non-human aspects (e.g country of origin, advertisements, brand name, package design) (Eisen & Stokburger-Sauer, 2013; Elliot & Barth, 2012; Heslop, Cray, and Armenakyan, 2010). It is the story telling of the experience of growing the grapes and making and consuming the wine that may create certain associations and a personality. Research into contents of top wine blogs have shown that these blogs make a concerted effort in telling a story about the experience of wine beyond just technical product attributes (Beninger, Parent, Pitt, & Chan, 2014). Of all wine personalities tested the ones that most strongly correlate with wine purchase are: "successful", "charming", followed by "spirited" and "upto-date" (Boudreaux & Palmer, 2007).

*Origin-Brand Quality Perception Extension, Brand Authenticity and Brand Reputation*

Literature has found OBB (origin bound brand) products (that cannot be separated from their origin) are created based around geographical locations reflecting unique features (Alderson & Martin, 1965; Becattini & Rullani , 1996). For wines this would be the vaunted "terrior" or the family practices of running the business over generations. This has allowed players in the wine industry to take advantage of additional brand equity assets for OBBs such as a certain leniency towards inconsistencies, perceptions of authenticity and loyalty towards origin/parent brand (Spielman 2014).

Wines can be inconsistent with different vintages producing different wines from the same producer. In cognizance of this fact consumers also tend to be more flexible in their perception of quality. They look not for "consistent contents but for "consistent quality" that can deliver on the expectations and beyond (Charters, 2009). Brand authenticity depends on the signals the brand communicates (its essence) through country associations, history, and long held family connections (Aaker, 1991; Grayson & Shulman, 2000; Grayson & Martinec, 2004). A unique origin or parent/founder persona associated with a brand makes it genuine leading to origin derived perceptions of authenticity (Dubey, 2017). For example Patanjali Ayurveda Limited of India was able to differentiate its brand and emotionally connect with consumers by associating it with the unique brand persona of its founder (Baba Ramdev) and a value positioning based on the "Swadeshi" (made in one's own country) concept (Dubey, 2017). For wines a brand can be related to a strong origin name bringing strong, consistent and favorable origin loyalty which increases the level of involvement of the consumer with the individual brands from that origin (van Ittersum, Meulenburg, & van Trijp, 2003). Brand associations with origin brand gets transferred to the individual brand, raising prospects of individual brand equity.

In a highly competitive field where consumers face difficulties in evaluating the complex quality of wine, reputation a key to success (Beverland 2005; Dressler, 2016). It serves as a proxy and signal for quality for brands and reduces the uncertainty of choice for consumers (Benfratello, Piacenza, & Sacchetto, 2009; Cavusgil, Hult, Kiyak, Deligonul, & Lagerstrom, 2007). In order to build up reputable brand, individual wine brands can support their brand building efforts by taking advantage of a strong "terroir" brand reputation (Charters & Manivel, 2010; Winfree & McCluskey, 2005) and expert ratings (Castriota & Delmastro, 2012; Hay, 2010). Terroir can mean a large region such as Burgundy, France one of its appellations or even a single vineyard with a unique set of terroir characteristics. Just as a strong regional terroir reputation can transfer to a vineyard in that region, a single vineyard terroir reputation can translate to wines made from grapes grown in that vineyard. Expert ratings have been shown to facilitate wine reputation and choice and higher expert ratings yield price premiums (Ashenfelter & Jones, 2013; Dubois & Nauges, 2010).

*Lifestyle Positioning*

Lifestyle can be defined as an outward expression of individuals about their opinions, interests, desires, and behavioral tendencies to participate in social, economic and political life (Kindra, 1994). Consumers following a certain lifestyle desire some product categories more than others because of a better fit with that lifestyle. Lifestyle positioning has helped well recognized brands in many product categories overtime turn a functional consumption of product offerings into a symbolic consumption (Kornberger, 2010). Lifestyle positioning is about marketing the product and brand as a way of life. This can be achieved by creating an appealing personality that aligns with the target segment's desired identity and then showcasing that through product placement in a current or aspirational lifestyle and slice-of-life setting (Clow, James, Sisk, & Cole, 2011). Both together have been shown to engender positive feelings in consumers. The strategy goes beyond enhancing simple brand experience and considers a more holistic consumption experience which includes perceptions and values (functional, social and hedonic) arising out of product use (Mishra, Dash, & Cyr, 2014). Positioning a product surrounding these experiences help create a certain product personality characterized by associations which when aligned with customers' lifestyles help strengthen their bonds with products and brands (Batra, Lenk, & Wedel, 2010; Mishra et al., 2014). Firms operating in industries as varied as fashion apparel, home décor, fitness, sports, and culinary arts are catering to specific consumer lifestyles (Danskin et al., 2005).For the last couple of decades retailers have engaged in lifestyle positioning and marketing supported by lifestyle segmentation (Babin & Babin, 2001; Duff, 2001). Research has found that consumer decision making in retail is influenced by lifestyle

based emotions such as interests and attitudes (Babin & Babin, 2001). Television broadcasters (an industry related to publications) have also successfully used lifestyle positioning in programming and usage of social media (Bae, 2000; Fergusan & Greer, 2016). The lifestyle positioning was achieved through types of topics covered, unique stories and posting of lifestyle contents on pinterest. Lifestyle based decision making have also been observed for wine. Orth, McDaniel, Shellhammer, & Lopetcharat (2004) found that consumers' purchase decision is influenced not only by functional benefit perception of the country of origin but also by social and emotional connection to the same. Top lifestyle brands such as Nike, and Apple showcase several characteristics of lifestyle brands. Lifestyle brands 1) have a certain personality, 2) reflect and aid consumers way of life through associations, 3) provide value in terms of emotional, functional and social appeal, and 4) engage the customer to interact with the brand (Austin & Matos, 2013).

Success in lifestyle positioning and developing lifestyle brands is contingent on determining lifestyle factors that impact consumer behavior of the target segment. Magazine publishers too have successfully joined the bandwagon. The Playboy magazine successfully brought lifestyle based market research information in its magazine contents to construct an illusion of a typical playboy reader who would reflect middle class men's aspirational self in his lifestyle and hedonistic tastes. The magazine strategically integrated this persona in all contents of the magazine (Coultier, 2014). Inflight magazines have also positioned themselves as standing for "global lifestyle" (a key aspirational personality of its high value customers) through promotion of global lifestyle, culture, adventure and last but not the least through visualizing their numerous travel destinations on world maps (Thurlow & Jaworski, 2003).


**Research Questions**

The overarching goal of this paper is to understand and discuss the role of Wine Spectator magazine in promoting and supporting the wine industry. To fulfill this goal the paper discusses the branding and positioning strategies, lifestyle and otherwise utilized by the Wine Spectator magazine to promote and create a perception surrounding the product wine and its consumption, and of specific wine regions, wineries and wine brands. To facilitate discussion of the above the following research questions will be answered in the next few pages.
1. What is the breadth and depth of information that this magazine covers? What is the extent of coverage of different wine countries, regions and sub-regions, wineries and wine brands?
2. What types of non-wine topics does the magazine cover?

3. How much of the magazine is devoted to wine advertisements? To non-wine advertisements? What is the extent of advertising by wineries of different countries and regions?
4. What is the format and layout of the magazine?
5. What is the tone and style of the writing?

**Research Method**

The exploratory nature of the paper makes content analysis an effective form of research method (Krippendorff, 2004). Content analysis is an established method of systematically, objectively and quantitatively analyzing textual communication material (Neuendorf, 2002; Pavlov & Dimoka, 2006). Content analysis also has several advantages compared with surveys and interviews. There is less bias during data collection because the creators of the documents being analyzed are not involved. Also the actual text is analyzed instead of perceptions and views expressed in a survey or interview (Beninger, Parent, Pitt, & Chan, 2014).

The following are selected as relevant analysis categories: 1) wine growing countries, regions, sub regions, and individual wine company or brand, 2) wine related and non-wine products and issues, and 3) wine and non-wine advertisements.

The content analysis is both objective and subjective. The paper presents frequencies, column inch and percentages for the analysis categories mentioned above. Column inch is calculated by multiplying the length of a typical column in inches with the number of columns devoted to the topic. It includes both words and pictures. Wine Spectator's typical column length is 12 inches and has three typical columns in a page each of a breadth of 1 inch. These measures are commonly used in content analysis of publications (Chaney, 2000). There is also subjective description and analysis of the topics covered on wine, wine related and non-wine products and services, the format and layout of the magazine and the tone and style of discussion

The unit of analysis is each of the 15 issues of the magazine for the year 2016. A year's worth of issues can be argued to have enough coverage. 2016 was the 40th anniversary year of Wine Spectator. It can be argued that magazines would tend to showcase and underscore their direction and raison d'etre more clearly in anniversary year issues (Rodin, 2012) which can attract more readership and hence more advertisements (Bazilian, 2015).

Information from each of the 15 issues were categorized based on the analysis categories. These categorized information was then amalgamated and discussed to achieve a holistic view helping address the objectives of the research.

**Content Analysis Results**

Content analysis found that almost equal space is devoted on average between coverage of wine, and that was allotted to discussion of wine

related and non-wine topics. Additionally almost 14 percent of magazine space on average is devoted to just non-wine aspects of the wine centered lifestyle. This is reflected by the kinds of advertisements in the magazine. Almost 40 percentage of the advertisements are from providers of non-wine products and services.

*Coverage of Wines, Wine countries, Regions and Sub-regions*

A total of 11 countries, 22 wine regions, and 12 sub regions within these countries were mentioned multiple times. The three wine growing countries of United States, France and Italy together with their regions, sub-regions, estate vineyards and wineries got the most attention and review by a large margin, compared to other old and new world wine countries. The number of times the three countries and their regions and sub regions are mentioned are as follows: US (1232), France (1052) and Italy (770). Among regions and sub regions, California (493) and its sub regions Napa (246) and Sonoma (146) together garnered the most mentions. Even though Piedmont region of Italy is behind Tuscany in number of mentions its sub region of Barolo (40) is third highest in frequency of mentions after Napa and Sonoma.

The same break up is also reflected in the space (column inch) allotted to review and discussion of wines. A total of 14 countries spanning all continents and 13 regions within these earned column inch space. 3818.5 column inch is devoted to US, followed by France (3436 column inch) and Italy (1987.5 column inch). There is a sharp drop from there with Australia earning 712 column inch and a Israel, Spain, Portugal, New Zealand earning in the 300's. California at 1944 column inch and Bordeaux at 1296 column inch came at the top of the region coverage followed by Burgundy region in France and Piedmont region in Italy at 648 and 432 column inches respectively.

It is expected that a US based magazine will pay most attention to US wines. The high coverage of Italy can be explained in light of the fact that Italy has the highest share of foreign wines sales in the US. The importance given to France is interesting. France lags behind multiple countries in its share of the US market by volume (https://www.statista.com/statistics/669346/us-wine-import-volume-country-of-origin/). Explanation of France's high exposure in the magazine could lie in two other realities. France makes up in value what it lacks in volume in the US import wine market, being only second to Italy in 2016 (ttps://www.statista.com/statistics/233681/value-of-the-leading-6-wine-import-countries-to-the-us/). US thus imports a smaller number of higher priced wines from France compared to some other markets (David Morrison, 2018). When this is coupled with the fact that the primary segment of Wine Spectator is interested in premium wines it can explain why the magazine promotes French wine so avidly particularly from the prestigious regions of Bordeaux and Burgundy. It is quite likely that among the readers of Wine Spectator French wine is

sought after. French wine tends to have a high quality perception across the world more than wine from any other region. So the magazine may have a strategic interest in promoting wines from France particularly from Bordeaux and Burgundy to increase awareness of the origin of these wines and helping to reinforce the high quality perception of French wines in readers' minds and premiumness of the publication.

*Coverage of Wine related and Non-wine Topics*

On average almost 50 percent of coverage in an issue is devoted to wine related and non-wine topics. It is important to categorize these two separately for a clear and complete understanding of the breadth of coverage of the magazine. Wine related category includes topics that directly relates to wine such as labelling, wineries and vineyards (related to but different from coverage of wines from those wineries). The non-wine topic area is further categorized into 8 groups based on the non-wine areas that are more commonly and repeatedly covered throughout the year. These are people, events, restaurants, travel destinations, beverages, homes, magazines, and food and cooking.

Almost 14 percentage space in an issue on average is devoted just to non-wine topics. 4957.5 column inch is devoted to wine related topics and 11,388.5 column inch to multiple non-wine topics. The more popular non-wine related topic areas in terms of column inch coverage are people, food and cooking and events, with restaurants and travel showing some coverage.

Substantial space devoted to discussion of a diverse range of topics indicates that Wine Spectator magazine is strategically placing wine, wine consumption and wine culture at the heart of a broader consumer culture. It is trying to position the product wine as a defining aspect of a cultural pattern. A review below of the major topics discussed should help us understand this strategy better.

*Major Topics*

Each issue of the magazine has a major cover story and then 2 to 5 featured articles. Significant coverage is allocated to either. The cover story is also pictorially featured on the cover page making this most likely a prime motivator for purchase. The cover stories together have 7 reviews on wine and 17 on wine-related and non-wine topics. The featured articles together have 31 reviews on wine and 19 on wine-related and non-wine topics. The wine related topic coverage mostly revolves around highlighting particular wineries. The non-wine topic had stories of people from the wine and culinary world, restaurants, events, food and cooking, travel destinations and other alcoholic beverages. The second highest number of articles after those on wine are on people (6 in the cover stories and 8 in the featured articles). These highlight particular wine makers, their families and their estates from different parts of the world.

Homage is paid to 43 leaders of the wine industry from across the world with a dedicated cover story on them.

The major topics (cover story and feature article) primarily cover the United States, followed by France and then Italy. Of The new world Australia got one of each but no one else from the old world. In the view of the complete omission of cover stories on Spain and most new world established wine countries, an interesting and probably surprising cover story is that on the wines of Israel.

The major topics particularly the cover stories are written to draw readers into another world that is geared to be informative but also exciting, and humane. These not only have technical information on the terroir, grapes and wines to help readers become more knowledgeable but also build a story in words and pictures around the history of the place, the trials and tribulations of the wine makers and their eventual successes. It is interesting to note that even though Italy lagged behind US and France in coverage of its wine regions (Italy does not have cover story on any of its wine regions), 3 out of the 9 winemakers showcased in the cover stories and featured articles are Italian winemakers, compared to only 1 from France. The rest are from the US. Apart from concentrating on US wines, the magazine could also be following dual strategies of promoting Italian wines (the most imported in the US) and covering major wine growing regions of France, to facilitate a potential increase in consumption of French wine among its readers. The major topics also significantly cover other (besides people) non-wine topics notably in the areas of cooking, cheese, restaurants, wine experience events and travel destinations to name a few. This supports the strategy of promoting a wine centered lifestyle. (Table 5).

*Advertisements*

On average 42 percent of magazine space is devoted to advertisements of all products and services, 23 percent on wine advertisements and 19 percent on non-wine advertisements. The 15 issues of the 2016 publication has advertisements on products and services from 31 industries. These include such varied industries as automobiles, financial institutions, home improvement, clothing, cigars, sporting events, hotels, hospitals, tours, magazines and jewelry and mobile applications to name a few. These variety in advertisements is a reflection of aspects of a material lifestyle of which the magazine is trying to make wine a center point of.

This reality is probably a combined effect of the magazine's efforts in inviting advertisements from providers of a broad range of products that are part of the wine centered lifestyle and interest from the latter to advertise in the magazine based on their perception of the magazine and a certain knowledge about the segment that forms the primary readership of the magazine.

In frequency of advertisements of brands or wineries the US by far leads at 204, followed by Italy at 123, Chile at 59, and France at 55 advertisements respectively. Brands from Portugal, Argentina, Spain and Australia had mid to low double digit advertisement frequencies.

Across country of origins a total of 293 brands advertised their wines in the 15 issues of 2016. Only 19 percent (57) advertised 3 times or more over the course of the year and a little less than 4 percent (11) has 6 and more advertisements. All except two (Spain and Chile) of the top ten advertised brands are from the US. The top 4 advertising brands (from highest to lowest) with 9 and more advertisements are the following: Beringer, Layer Cake, Chateau Ste. Michelle, and Robert Mondavi.

There is to be some level of disconnect between wine coverage and wine advertisements in terms of country exposure. This is particularly stark both for France and Chile. French wines and wineries are significantly covered but not Chilean wines and wineries but Chilean brands advertised much compared to French brands. Chile could be looking to compensate for the lack of coverage with advertisements and the US market may not be a priority for French wineries.

*Shape, Layout, Formatting, Tone and Style of Writing*

Each magazine issue which comes in a 13 by 10 inches rectangular size is heralded by a bold and vibrant visual about the major topic for that issue headed by a large size print of the magazine name written in elegant style. The publication is made from glossy and thick paper. The writing inside is in black letter set in a white background and approximately the shape and size of a 12 point Times New Roman font. The cover page is attention grabbing and can be called attractive. The description which is set in blocks of different sizes is interspersed with complementary vivid pictures of wine bottles, vineyards, wine makers, wine regions, food, restaurants etc. The information is well organized, easy to follow. The contents are separated every few pages with equally vivid advertisements quite a few of which are of full page and some double pages.

The tone of the narration is educational but friendly and style of the writing is conversational. Reading the magazine is similar to having a conversation with a friendly consultant someone one knows personally, and who also happens to be an expert on wine and knowledgeable about other non-wine topics.

**Discussion**

***Wine Spectator's Positioning and Branding of Wine***

Awareness, associations (personality and image) and perceptions of quality are all part and parcel of building brand equity. For an origin bound product such as wine that is also difficult for consumers to evaluate because of a certain social and technical complexity inherent in the product and it's consumption, it is also important to consider perceptions of authenticity, loyalty to origin and reputation.

Effective branding depends on a concerted and layered effort at making consumers aware of the product supported by developing a strong bond with them through creating an image, an identity and high quality perception of the brand. Lifestyle positioning builds this bond associating the product with facets of it's consumption experience within the fold of the consumer's current or aspirational lifestyle, in turn creating a personality, an image, an identity and a reputation of the product that aligns with the functional, social and emotional values of the consumer. Does Wine Spectator magazine engage in these aspects of positioning and brand building and how does it do it?

The cover stories and featured articles contain both objective and subjective information that a reader would find valuable and interesting. There is a description and discussion of the land, the grapes, farming and wine making techniques, the wine makers and their wineries, and the macro region level and micro winery level changes taking place. These articles build stories of a wine world, past, present and future with all the trimmings and help build brand authenticity and origin loyalty. Where to stay and where to eat for travelers interested in traveling to the wine region under discussion is not forgotten. In the back drop of such story telling is valuable objective information that helps in decision making about purchasing wines from the region or estate. Recommendations on specific wine brands with ratings and prices are provided for each region. Two issues include wine reviews and ratings as major topics (top 100 wines from across the globe for multiple years, wines from lesser known wineries and "value" wines. Every issue also has a "buying guide" section with recommendations of wines from brands and countries. Recommendations include descriptions of the style of the wine, the aroma profile and the number of cases made, creating an aura of desirability and exclusivity. There is also a Savvy Shopper page in each issue with highlighted recommendations of wines of high quality with less than the usual high prices. Literature has shown that for a product like wine, expert ratings and objective reviews help create a high perception of quality.

Wine Spectator also addresses multiple aspects of the wine centered lifestyle to entice their readers to engage with that lifestyle. Besides wine, major topics are also built on non-wine aspects of the lifestyle such as food and cooking, people, restaurants, events and travel. 6 out of 15 issues have non-wine topics as the cover story, notably people, food and cooking, and restaurants. Stories are weaved for these contextual aspects of a wine centered lifestyle. Two issues devote primary cover stories to cooking and pairing food with some of the top wine varietals, and cooking with cheese and pairing with wine. Another two showcases homes of celebrities and ordinary people which the owners renovated to better suit their cooking, food and wine oriented lives. A third issue does an extensive review of restaurants across the

globe who have been awarded awards for their wine lists. Besides these major discussions every issue has snipets of information on multiple non-wine topics. These stories and discussion make a good effort at involving the reader by providing interesting information that enhances the knowledge of the reader (such as the history of mozzarella cheese) and at the same time, probably more importantly, motivates the reader to engage in the wine centered lifestyle such as visiting one of the award winning restaurants, and trying their hand at one of the recipes.

Wine spectator magazine first elevates the attraction of the very product category of wine by positioning and branding it as a lifestyle product through stories of various other aspects of the wine centered lifestyle such as cooking, traveling, and wine events to name a few. The almost even allocation of space between wine and non-wine advertisements in the issues also reinforce the lifestyle positioning of wine. At the brand or estate level the magazine utilizes both human and non-human ways to develop associations, personalities and identities by connecting with the functional, social and emotional aspects of the reader's lifestyle or the one she aspires to. In its cover stories and featured articles on wine it not only extensively discusses the terrior and wine making techniques (non-human aspects) but also weaves the story of the wine maker into that (human aspects). Plentiful and vivid pictures of the winemakers, their families and the wineries further add to the human personification of the wine, the winery and the region. The dual information on the uniqueness of wine regions and the wineries in these regions help develop specific personalities, brand authenticities and evolving origin loyalty. Wine personalities that have been shown to be effective in increasing purchase are also reflected in the magazine stories of wines, and wineries of Robert Mondavi of California (Successful and Charming), Lodovico Antinori of Italy (Successful); Allegrinis of Italy (Successful and Charming); Joe Wagner of California (Successful, Spirited and Uptodate) and Russell Bevan of California (Spirited) to name a few. In these stories the region and to some extent the country of origin are connected to the brand helping develop a perception of brand authenticity and overtime origin loyalty. Wine does not simply remain a bottle to be opened and consumed, it becomes a living breathing entity with a story behind it.

## Conclusions

Wine Spectator Magazine is described by Wikipedia as a "lifestyle magazine that focuses on wine and wine culture." The overall analysis reinforces that description. The overarching goal of the paper is to explore the impact of Wine Spectator magazine on the wine industry in terms of creating a perception of wine and the kind of positioning strategies and tactics it utilizes to promote wine. The magazine clearly engages in lifestyle positioning to brand the product wine. Through its objective information sharing on wine and non-wine products and

services, and the stories of people and places, it not only strives to create awareness, associations, reputation and loyalty surrounding wine and wine regions, but also elevates wine to be the locus of a lifestyle. The typical reader of the magazine is affluent and the magazine successfully places wine in the center of the lifestyle of this reader as the quintessential symbol of sophistication, quality and the good life. Through its reviews, discussions and stories it makes its readers aware of both objective information about wines, grapes, and wine making techniques, help build associations primarily through humanizing the brand, winery and wine region, facilitates origin loyalty through enhancing brand and region authenticity and contribute to brand, winery and wine region reputations through extensive expert ratings. This is done within the broader umbrella of a wine centered lifestyle. Wine Spectator magazine has successfully elevated wine to a lifestyle brands with personalities and associations that provide functional, social and emotional values and that engage the consumer to interact.

**Implications and Limitations**

There are practical and theoretical implications of this research. This research has implications for wine makers. It showcases the different facets of implementation of a lifestyle positioning by an industry magazine that other publications and wine makers can emulate. This paper also reinforces the importance of lifestyle positioning by providing evidence of it from yet another industry. A consolidated and comparative analysis like this that covers information on wineries, wine regions, wine related and non-wine products and brands advertised should also help wine makers develop future competitive strategies.

More specifically the paper highlights a couple of strategies that wine makers can emulate to strengthen their brand positioning in collaboration with the magazine. First it highlights the importance of taking advantage of complementarity and recency effects by advertising more in the issue in which their winery or region is covered extensively. Second, it underscores the importance of the proximity effect. Having brand advertisements interspersed with the story from the same winery or region increases the likelihood of impact of that region.

This research also contributes to theoretical development of the wine marketing academic field by acting as a foundation of future research. This is the first content analysis of an established wine magazine attempted in the last 10 years and the wine industry has changed quite a bit in that time. This is also the first analysis of an established wine publication with a primary focus on lifestyle positioning and branding.

A limitation of this research lies in the sample size which only includes issues from one year. Analysis of multiple years' worth of issues would have made the contribution stronger.

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# REDUCTION OF PREVENTABLE READMISSIONS THROUGH A PHARMACIST-DRIVEN TRANSITION OF CARE PROGRAM

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## ABSTRACT

Hospital readmissions have a significant impact on cost and outcomes for patients. Many times, readmissions can be linked to gaps in care transition planning while in the hospital. These gaps include proper planning for self-care, compliance to care plans, and issues with home medication self-management. This paper explored the literature and presents options for reducing readmissions via expanded use of pharmacist. Pharmacists are medication experts and can be utilized to decrease the number of readmissions linked to medication management issues (e.g. medication reconciliation, "meds to beds" programs, and post-discharge follow-up phone calls). Findings discussed in this paper concluded that involvement of pharmacists in the discharge process can greatly enhance efficiency, patient safety, and reduce readmissions. The central theme of this paper recommends a more central role for pharmacist and pharmacy technicians toward a multidisciplinary approach to discharge planning.

*Keywords:* transitions of care, pharmacist-led, medication reconciliation, prevention of
readmissions

## INTRODUCTION

Readmissions are a source of increased risk and costs for hospitals, insurance companies, and patients. In 2016 alone, there were more that 4.2 million all-cause readmissions with costs ranging from 7,000 to 19,000 dollars, depending of various factors (Bailey, Weiss, Barrett, & Jiang, 2019). There are a host of contributing factors related to readmissions. This paper focuses on the medication management process as a contributing factor. Results from a systematic review by Morabet et.al (2018) indicated that a median of 21% of readmissions were due to medication related problems (MRPs). Other contributory reasons for readmissions include premature discharge, socio-economic issues with obtaining needed medications, poor or no follow-up planning, and confusion about medication

instructions post-discharge. Thus, these factors are an opportunity for a multi-disciplinary team (inclusive of a pharmacist) to support the discharge and post-discharge continuum (Gil, et al., 2013). Poor medication adherence emerges as a preventable cause for readmission.

## THE ISSUE OF HOSPITAL READMISSIONS

Hospital readmissions are defined as an admission within a short proximity post-discharge, typically within 30 days. Readmissions can be frustrating for patients, costly to the healthcare system, and also put patients at an increased risk for developing hospital acquired infections (Horwitz, et al., 2011). Some readmissions are unavoidable, as they may be due to an unrelated cause such as a hip fracture post-discharge. Additionally, they may result from progression of illness or worsening of chronic disease as part of the disease process. Preventable readmissions may be linked to poor quality in-hospital care, discharging of patients before they are capable to care for themselves, and poor transitional care (Horwitz, et al., 2011). The Centers for Medicare and Medicaid Services (CMS) developed hospital readmission metrics for patient conditions including heart failure, pneumonia, acute myocardial infarction (AMI), stroke, hip and/or knee replacement, vascular surgery, and chronic obstructive pulmonary disease (COPD). These conditions are among those that are most costly that result in higher mortality. Hospitals are required to report their all-cause 30-day readmission rates. These data are available to the public so that patients may compare hospitals and make informed choices about where to receive care. Since readmission rates relate to aspects of quality care, it is important for healthcare systems to devise programs to prevent readmissions.

In the United States, about 14.9% of Medicare enrollees aged 65 and older on average are readmitted within 30 days of hospital discharge (United Health Foundation, 2019). In 2013, the average cost of a readmission for a patient 65 or older was $13,800, which was higher than the cost of the initial admission (United Health Foundation, 2019). The Hospital Readmissions Reduction Program (HRRP) is a Medicare value-based purchasing program that lowers payments for hospitals that have too many readmissions (CMS, 2018). The purpose of the HRRP is to improve the quality of healthcare in the United States by linking hospital reimbursement to the quality of care (CMS, 2018). The implementation of this program gives hospitals financial incentive to better communicate and coordinate care with the primary team during admission as well as with patients, caregivers, and other facilities on post-discharge planning (CMS, 2018). CMS defines an all-cause 30-day readmission as an unplanned readmission within thirty days of initial admission, or patients who are readmitted to the same hospital or another acute care hospital for any reason (CMS, 2018). The term all-cause indicates that return to the hospital for any reason is subject to a penalty. This idea was meant to encourage hospitals to view and plan for the continuum of needs for the patient vice an episodic concern. The metric that CMS uses to determine if adjusted payments are necessary for a particular hospital is the excess readmission ratio

(ERR). The ERR is the ratio of predicted to expected number of readmissions for AMI, COPD, heart failure, pneumonia, coronary artery bypass graft surgery, and elective primary total hip arthroplasty and/or total knee arthroplasty (CMS, 2018). Based on the ERR, the hospital's payments for all discharges in a fiscal year are reduced by the payment adjustment factor, regardless of the condition (CMS, 2018). Thus, hospital readmissions are a quality concern as well as a financial one.

## TRANSITION OF CARE AND PHARMACY

Transitional care is the overarching term for a broad range of services designed to promote safe and timely passage of patients between multiple levels of healthcare (Naylor & Keating, 2008). A key consideration throughout transition of care is how medications are and will be managed. Transitional care is especially important in elderly patients who may have many chronic conditions with complex therapeutic regimens (Naylor & Keating, 2008). Often these patients are managed by many providers with potential for hospital admissions resulting from any one of them. Many elderly patients may may require a caregiver or may be transferred to a nursing home upon discharge. Transitioning from the inpatient setting to skilled nursing or home care is a tedious process, that must be done carefully. Miscommunication of medication requirements can prove detrimental to the health of a patient in this process and lead to a poor outcome (e.g. readmission). Poor transitional care has been linked to adverse events, low satisfaction with care, and high re-hospitalization rates (Naylor & Keating, 2008). "Transitional care includes effective discharge planning, transfer of information at the time of discharge, patient assessment and education, and coordination of care and monitoring in the post-discharge period" (Horwitz, et al., 2011). Randomized controlled trials resulted in themes or areas of improvement in the prevention of readmissions. Those include quality of care during initial admission, improvement of communication with patients, caregivers, and other providers, patient education, pre-discharge assessment, and coordination of care post-discharge (Horwitz, et al., 2011). Embedded in each of these themes includes how new medications are started, old ones stopped, and education for the patient of what is required for self-management.

With passage of the Patient Protection and Affordable Care Act (PPACA) in 2010 the HRRP was established to highlight the importance of transitional care. Medication discrepancies such as name, dose, route, and frequency increase adverse drug events and account for many hospital readmissions (Bulloch, 2017). Many times, these discrepancies occur upon admission and their effects seen upon discharge. A Joint Commission national patient safety goal (NPSG) requires that medication reconciliation be performed upon hospital admission. Medication reconciliation involves an interview to discuss home medications the patient, dosing, frequency, and accounting for any over the counter products. The goal of medication reconciliation is centered on patient safety while ensuring patients receive the appropriate medications while in the hospital. A medication reconciliation is also performed when a patient is discharged to ensure that they

are aware of all medications that have been discontinued during their hospitalization, medications that have been initiated, and that they are counseled on their new regimen to ensure that all of their questions are answered. Daily rounds present an opportunity for pharmacist input and recommendations during the patient's inpatient stay. The use of pharmacists in rounding varies by facility, most likely due to the cost. Pharmacists involvement with final discharge planning and patient education can help ensure patients receive appropriate prescriptions and new medications prior to leaving the hospital. Often times when patients are discharged they still do not feel their best and some may not remember important instructions while others may skip the line at a pharmacy to pick up their medications. In addition, patients without resources for co-pays may not be able to afford their new medications. These result in a domino effect of poor patient medication compliance post-discharge which in-turn causes health decline and ultimately readmissions. The value of pharmacist on the transition team is indispensable. Outside of the obvious expertise, pharmacist have expanded knowledge about generic alternatives or pharmaceutical benefits programs which may assist patients with less means. Finally, pharmacist follow-up phone calls with complex patients can clarify with any questions about their doses or side-effects. Hospital pharmacists are an important part of the healthcare team and can be utilized in many ways to improve the quality of patient care and to prevent readmissions.

## LITERATURE REVIEW

In a study by Nester & Hale (2002) entitled "Effectiveness of a pharmacist-acquired medication history in promoting patient safety", the impact of a pharmacist-obtained medication history was compared with the institution standard of nurse-obtained medication histories. The study found that when a pharmacist obtained the medication history there were more discrepancies identified between the reported home medications and the original hospital medication orders (Nester & Hale, 2002). These discrepancies are important to note as they had the potential to impact safety in the medication management process. Compared with nurses, pharmacists identified more patients taking herbal supplements and over the counter medications (Nester & Hale, 2002). This study also documented the time it took to perform the medication review and reconciliation. Nurses took longer on average to perform the medication review, and it took pharmacists longer to reconcile the medications when the review was initially performed by a nurse (Nester & Hale, 2002). Thus, the rework involved proved inefficient and potentially unsafe for patients. High-reliability principles indicate that processes should defer to expertise in areas that have high potential for error. This study supports the notion that pharmacists are the medication experts and can more easily identify errors during medication reconciliation. Pharmacists are taught how to accurately take a medication history to ensure that all over the counter and herbal medications are included. The study concluded that the time spent by pharmacists to conduct medication history interviews was considered efficient and worthwhile (Nester & Hale, 2002). Pharmacists

performing medication reconciliations can also prevent medication errors for patients when they are admitted.

In a randomized controlled trial conducted at Brigham and Women's Hospital, patients were assigned to either a usual care group or a pharmacist led intervention group (Schnipper, et al., 2006). The pharmacist interventions included discharge medication reconciliation; review of indications, directions for use, and potential adverse effects of each discharge medication with the patient; discussion of significant findings with the medical team; and screening patients for previous drug related issues, including noncompliance, lack of efficacy, and side effects (Schnipper, et al., 2006). Pharmacists also performed a follow-up telephone call to compare the patient's self-reported medication list with the discharge list and explore discrepancies (Schnipper, et al., 2006). The pharmacist also discussed medication adherence, possible adverse events, and adherence with scheduled follow-up and laboratory appointments (Schnipper, et al., 2006). Ninety-two patients were randomized to the pharmacist group and 84 to the normal care group. In the intervention group, pharmacists found 34 missing medications on discharge medication reconciliation and 12 cases of an incorrect dose or frequency of a medication. Forty-five patients (49%) had one or more unexplained discrepancies in their discharge medication orders (Schnipper, et al., 2006). Overall, pharmacists recommended 80 changes in 55 patients (Schnipper, et al., 2006). During follow-up phone calls (within five days of hospital discharge), pharmacists noted discrepancies between discharge medication lists and reported home regimen in 56 patients with medication nonadherence in 23% of patients (Schnipper, et al., 2006). This study found that there was a lower rate of preventable adverse drug events when pharmacists performed the medication reconciliation, discharge counseling, and telephone follow-up for discharged patients. The value of pharmacists in this study illustrated important ramifications for patient safety and preventable readmissions. Programs similar to this study may be beneficial for healthcare systems in prevention of adverse drug events, medication regimen compliance, and reduction of readmissions.

In an observational pre and post analysis at an academic medical center, rates of hospital readmissions and return to emergency department visits were evaluated in a three-month period before and after a pharmacist driven program implementation (Anderegg, Wilkinson, Couldry, Grauer, & Howser, 2014). The pharmacist program included medication reconciliation upon admission and discharge, expanded services in the pre-anesthesia testing clinic, emergency department, a medication reconciliation technician team, and pharmacist to patient ratios of 1:30 on acute care floors and 1:18 on critical care units (Anderegg, et al., 2014). Medication reconciliations were completed by pharmacy teams in 95.8% of patients on admission and 69.7% of patients at discharge (Anderegg, et al., 2014). Discharge education was provided to 73.5% of high-risk patients including those discharged on anticoagulants, treated for acute MI, chronic obstructive pulmonary disease, congestive heart failure, or pneumonia (Anderegg, et al., 2014). While no

difference was found between pre and post groups with regard to 30-day readmissions, there was a significant reduction (p=.042) in 30-day readmissions in the high-risk subgroups from 17.8% to 12.3% (Anderegg, et al., 2014). This study illustrated that implementation of a pharmacist-led team to perform medication reconciliation with interventions in high-risk patient populations can decrease the 30-day readmissions.

A pilot study evaluated the effect that transition of care follow-up and counseling performed by a pharmacist had on 30-day hospital readmissions in Medicare patients compared with standard of care. Pharmacists contacted Medicare patients post-discharge to perform a medication reconciliation, review discharge instructions, and schedule follow up appointments with the patient's primary care provider (Tedesco, McConaha, Skomo, & Higginbotham, 2016). At the follow-up appointment, pharmacists reviewed the patient's medical record and made recommendations to the patient's primary care physician (Tedesco, et al., 2016). Although the difference in 30-day readmission rates was not statistically significant, there was a decrease in the number of overall patients readmitted in the intervention group compared with the control group (Tedesco, et al., 2016). Patients who met with the pharmacist face-to-face had a statistically significant decrease in 30-day readmission rates compared with those that received a telephone call P= 0.05 (Tedesco, et al., 2016). This study concluded that ambulatory care pharmacists have a role in decreasing 30-day readmissions.

## DISCUSSION

Healthcare organizations interested in high-reliability processes linked to readmissions should consider the value to pharmacist-driven involvement in the discharge process continuum. As the literature illustrated pharmacists can play a very important role on the multi-disciplinary medical teams to improve the quality of patient care and prevent readmissions (Tedesco, et al. 2016; Anderegg, et al., 2014; Gil, et al. 2013, Schnipper, et al. 2006, and Nester & Hale, 2002). Currently Medical Center has been working to expand the transition of care program. The facility currently has a medication reconciliation program in the emergency department to capture as many medication histories as possible when patients are admitted. The organization uses pharmacy technicians to gather medication information from all admitted patients with pharmacists review for completion and reconciliation in the patient record. In addition, Medical Center hired a transition of care pharmacist to perform medication reconciliations on patients who are already admitted and possibly missed in the emergency department, or perhaps did not have their medication list with them before they arrived on the medical floor. Often times inpatient physicians consult pharmacy to perform medication reconciliation on their patients.

Medical Center also has a "meds-to-beds" program run by the outpatient pharmacy team. The Medical Center professional pharmacy, located inside the hospital, is available for medication assistance consultations for patients who

cannot afford their medications due to lack of insurance or costly copays. When consulted, they perform a medication assistance visit, deliver the medications to the patient's room, and counsel the patient on the medications. They also inform the patients of their refill options at Medical Center Professional Pharmacy along with the same counseling assistance. Insured patients that can afford copays have the option to obtain their outpatient medications and make payment at the bedside with delivery. This program also ensures that patients are properly educated on their medications prior to leaving the hospital. The value of this program is it decreases the possibility of patients being discharged without their medications and prescriptions. Medical Center is working to expand this program to improve the quality of care they are providing as a healthcare system. This program has been successful for the institution, however the demand at this point has increased and is often overwhelming for the current staff. Program expansion will require a more efficient and streamlined process with additional pharmacy FTE's.

## PROPOSED IMPLEMENTATION PLAN

At Medical Center there are four pharmacy technician full-time-equivalents (FTE's), two during the day and two overnights, dedicated to performing medication reviews in the emergency department and one pharmacist FTE dedicated to inpatient medication reconciliation and review. In addition, there are two FTE's dedicated to the transition of care and "meds to beds" program, these pharmacists also attend rounds on specialty floors, such as the cardiac floors, with high-risk patients and help with discharge planning from a pharmacy perspective. There are no pharmacists assigned to make follow-up phone calls at this time. The organization has had to balance cost of adding FTE's with their benefits. Expansion of the "meds to beds" program would require at least two more FTE's to keep up with the growing demand for medication counseling, medication payment assistance, and the filling of prescriptions and delivery of medications to bedside. For the medication reconciliation program expansion, at least two medication review technicians would be needed during the day to perform medication reviews in the hospital.

While it would be desirable to include every patient, who enters the facility in these processes, the endeavor is cost-prohibitive. The greatest opportunity is for patients at high-risk for readmissions. These patients can be targeted to receive discharge counseling and follow-up phone calls from pharmacists and the cost-savings quantified. High-risk disease states should mirror those monitored by CMS including AMI, COPD, heart failure, pneumonia, coronary artery bypass graft surgery, and elective primary total hip arthroplasty and/or total knee arthroplasty. It may be most beneficial to focus on a few of these conditions at first and then expand as more FTEs are hired.

Buy-in and alignment for various stakeholders will require careful analysis based on the said stakeholder interests. Administrative buy-in is is likely achieved in understanding the operational and cost-benefit justification of additional FTE's

linked to reduction in readmissions. Often, administration weighs the monetary impact when new programs are considered for implementation. Physician and care team buy-in is also important for such a proposed program as physicians would need to work closely with pharmacists throughout the care processes from admission through discharge. In addition, physicians would need to be open-minded about pharmacist recommendations regarding medications in their treatment regimens. Lastly, the care team would also need to align with an expanded role for pharmacists. Nursing and other staff would need to follow processes and procedures for high-risk patients as they care for patients in their day-to-day activities. These processes center around expanded pharmacist inclusion in counseling, admissions and discharge medication reconciliation, and follow-up phone calls.

## CONCLUSION

This paper has highlighted the issue of hospital readmissions for patients with high-risk conditions. A significant segment of preventable readmissions are due to medication related issues and pharmacist can add tremendous value in prevention of adverse outcomes and readmissions. Pharmacists by training are the most appropriate care team members to perform medication reconciliation due to their knowledge as medication experts. They have been shown to be more accurate and efficient in discovering and resolving medication related issues during medication reviews. Pharmacists are a pivotal and critical part of the care team and their inclusion can improve quality of care and preventable readmissions.

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# SUSTAINABILITY DEVELOPMENT AND BROILER CHICKENS IN THE UNITED STATES

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**ABSTRACT**
This paper attempts to address various goals set forth by the United Nations related to the critical need for more emphasis on sustainability. A number of these goals related to ensuring the long-term provision of various sustainable food resources contributing to better health for individuals and for the planet. The importance of sustainable food resources is presented through the examination and comparison of production and consumption of broiler chickens. Beyond the production techniques and results, this paper also examines consumer behavior related to the demand and consumption of broiler chickens including the role of price elasticity.

Key Words: Sustainability, Broiler Chickens, Price Elasticity, Food Sources

## INTRODUCTION

Sustainable development focuses on meeting current needs without compromising the ability of human beings to meet their future needs. Three core, interconnected elements of sustainable development include environmental protection, economic growth, and social inclusion. Seventeen Sustainable Development Goals were adopted by all UN Member States in 2015, as a part of a 15-year plan to improve lives, protect the planet, and end poverty. The plan depends on three levels of action: global action, local action, and people action. The plan depends on global action to secure greater leadership and needed resources. The plan depends on local action such as by cities and local authorities related to policies, budgets, etc. The plan depends on the actions of people including youth, academia, the media, and the private sector to generate movement toward the required transformations (United Nations, 2020). Universities and their scholars from various academic disciplines including sociology, psychology, economics, and business are called upon to generate research, which contributes to Sustainable Development Goals (Bennett and Gadlin,

2012). This paper attempts to answer the call providing data and observations related to the comparative sustainability of the production and consumption of broiler chickens in the United States in relationship to the following five Sustainable Development Goals provided by the United Nations:

#3: Good Health and Well-Being: The goal of ensuring life and promoting well-being through measures increasing life expectancy and reducing a wide range of diseases.

#6: Clean Water and Sanitation: The goal to increase access to clean drinking water and sanitation to reduce the shortfall in fresh water resources.

#12: Responsible Consumption and Production: The goal to use the natural environment and resources to reduce destructive impacts on the planet, to increase resource efficiency, and to promote sustainable lifestyles.

#13: Climate Action: The goal to make a systematic shift to a more sustainable economy that supports both people and the planet through changing the trajectory of $CO_2$ levels in the atmosphere.

#15: Life On Land: The goal to reduce environmental stress through transformational changes to restore and protect the foundations of economies, livelihood, food security, health, and quality of life.

## BROILER CHICKENS IN THE UNITED STATES

The United States is home to the largest broiler chicken industry in the world. In addition, the United States exports approximately 16 percent of broiler chicken production to Mexico, Canada, Hong Kong, and other nations (National Chicken Council, 2018). Broiler chicken refers to young chickens, which are bred for chicken meat products. This paper investigates broiler chicken consumption trends, production trends, and price elasticity data related to the demand for broiler chicken. The broiler chicken industry has experienced significant advances in production efficiency and effectiveness, as well as market expansion and consumer acceptance.

## CONSUMPTION OF BROILER CHICKENS IN THE UNITED STATES

Chicken is the most commonly consumed protein in the United States. On a per capita basis consumers in the United States eat more chicken than do people from any other country, over 90 pounds per year. The consumption behavior of chicken products in the United States overall has changed significantly. Before 1920, chicken was only consumed during special occasions and was considered to be a luxury product. With the growth of

chicken processing plants, chicken broiler production became a significant industry during the 1930's. Thereafter, vertical integration and improved production techniques have provided for increased production and consumption of chicken broilers (United States Department of Agriculture, 2018). From 1960 to 2017, the per capita consumption of chicken broilers in the United States (Figure 1) has increased 285 percent. During that same time period, the consumption of beef has decreased 10 percent and the consumption of pork decreased 15 percent (National Chicken Council, 2018). In 1962, 83 percent of chicken products were consumed as whole birds, while only 15% of chicken products were consumed in cut-up parts. At that time only 2% of chicken products were further processed. In 2015, approximately 11 percent of chicken products were consumed as whole birds, while 40 percent of chicken products were consumed in cut-up parts and 49 percent of chicken products were further processed for other products such as chicken nuggets (National Chicken Council, 2018).

Figure 1. Per Capita Consumption of Broiler, Beef and Pork: 1976 – 2017
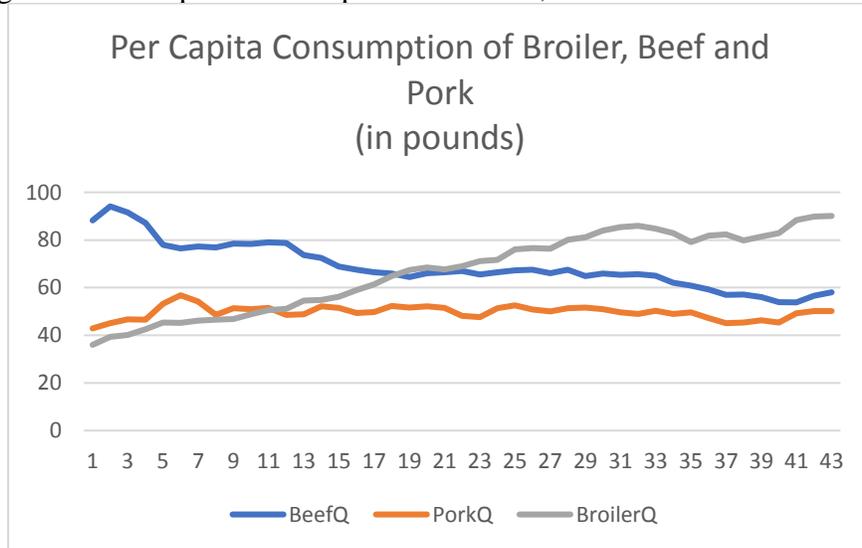


Source: National Chicken Council

In the United States, the domestic consumption of chicken broilers largely occurs within the retail grocery store or food service market segments. The consumption trend within these two market segments has shifted significantly. From 1970 to 2010, demand for chicken broilers within the retail grocery store market segment decreased by 25 percent, while the demand for chicken broilers within the food service market segment has increased by 76 percent (National Chicken Council, 2018).

The consumption of red meats, including beef and pork, has been associated with comparatively higher rates of negative health consequences. The higher content of saturated fats found in beef and pork are associated with increases in blood cholesterol and increases in heart disease (Heart.org, 2020). Consequently, the increased consumption of broiler chicken supports the sustainable development goal of "Good Health and Well-Being".

## PRODUCTION OF BROILER CHICKENS IN THE UNITED STATES

From 1960 to 2017, the production of broiler chickens in the United States increased 823 percent (National Chicken Council, 2018). Broiler chickens account for the majority of all chicken meat and most poultry meat production in the United States (MacDonald, 2008). Family farms located in states such as Georgia, Arkansas, Alabama, North Carolina, Mississippi, and others provide the majority of broiler chicken production, approximately 95 percent. Company-owned farms produce only 5 percent (National Chicken Council, 2018). The broiler chicken industry in the United States contributes significantly to the economy. The broiler chicken industry in the United States directly employs over 280,000 people and indirectly employs over 1,340,000. The annual wholesale value of broiler chicken shipments is $65 billion and consumers spend $95 billion annually on broiler chicken products.

Broiler chicken and poultry production, in general, have been found to be more environmentally friendly compared to the production of beef, pork, and other livestock commodities. Broiler chick and poultry production result in the least impact related to environmental stress, water use, and land size (Vaarst, Steenfeldt and Horsted, 2015). However, broiler chicken and poultry production do contribute to global warming due to various related requirements such as feed production and transportation. In addition, broiler chick and poultry production manure management contribute to eutrophication and acidification. Strategies for reducing the negative impact on the environment from broiler chick and poultry production include changes in feeding strategies, improved manure management, and genetic selection. Reducing some traditionally used ingredients in broiler chicken feed, such as pure amino acids, non-organic soya, and palm oil, is being implemented. Local sourcing of needed feeds can also reduce the impact related to transporting feed from other geographical areas (Leinonen and Kyriazakis, 2016). In addition, the production of broiler chickens in the United States (Figure 2) has become significantly more efficient and

effective. The number of days required for production has decreased from 63 days in 1960 to only 47 days in 2017. The average market weight of broiler chickens in the United States has increased from 3.35 pounds in 1960 to 6.18 pounds in 2017. Furthermore, the amount of feed required for boiler chicken production has decreased 61 percent from 1960 to 2017 (National Chicken Council, 2018). Consequently, the increased production of broiler chickens, compared to other livestock commodities, provides support for the sustainable development goals of "Clean Water and Sanitation," "Climate Action," "Life On Land," and "Responsible Consumption and Production."

Figure 2. Broiler Production: 1950 – 2017
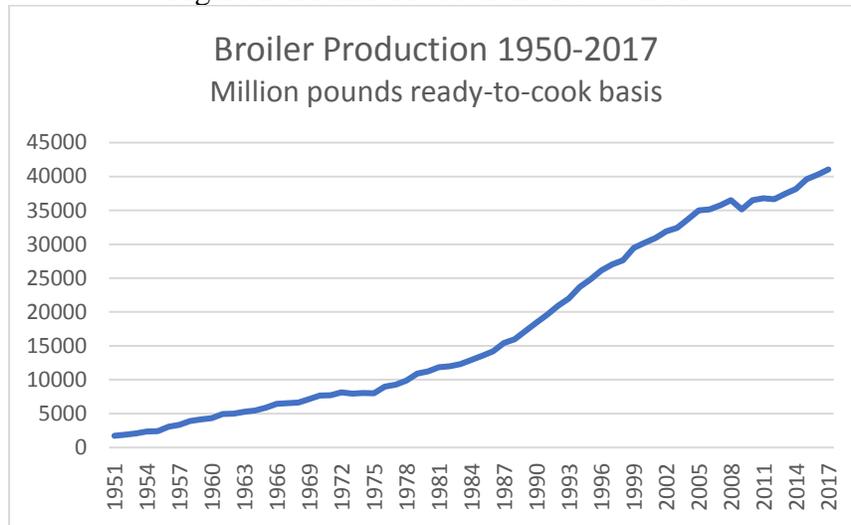


Source: National Chicken Council

## PRICE ELASTICITY OF BROILER CHICKENS IN THE UNITED STATES

Price elasticity of demand is a measure of consumers' sensitivity to price. Goods, which are more essential for daily living and/or have few substitutes, tend to have lower price elasticities (Gwartney and Stroup, 1997). From 1960 to 2017, the retail price of chicken broilers increased 337 percent (Figure 3). During that same time period, the retail price of beef increased 621 percent and the retail price of pork increased 587 percent (National Chicken Council, 2018). In 2015, for example, the retail price for beef was $5.73 per pound and $3.89 per pound for pork. The price for chicken broilers, however, was only $2.16 per pound (United States Department of Agriculture, 2018).

Figure 3. Retail Price of Broiler, Beef and Pork: 1976 - 2017
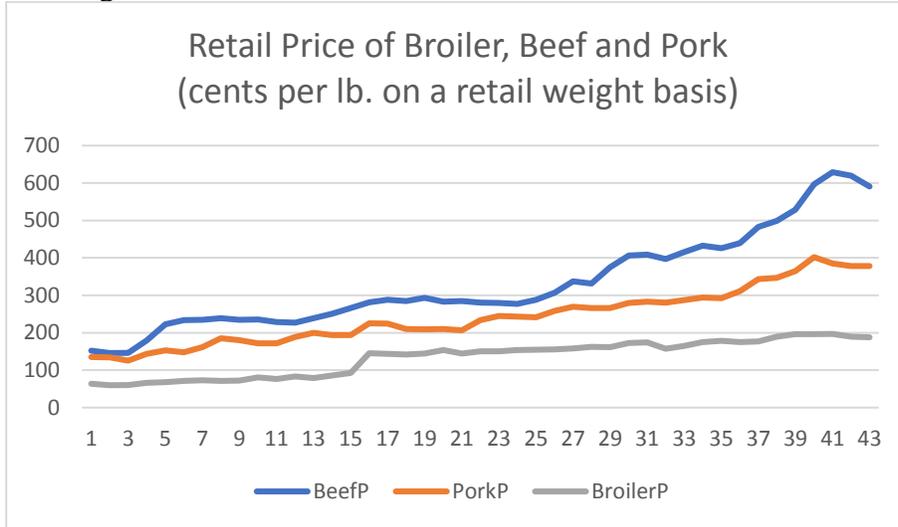


Source: National Chicken Council

Personal income refers to the incomes which households receive from various sources, such as employment, self-employment, and transfer payments. After taxes are paid, the remaining income is referred to as disposable personal income (Moody's Analytics, 2018). From 1976 to 2017, per capita real disposable income increased over 100 percent (Figure 4).

Further discussion of how these statistics on personal income relate to the broiler chicken industry is outlined in the next section of this study.

Figure 4. Per Capita Real Disposal Personal Income: 1976 – 2017
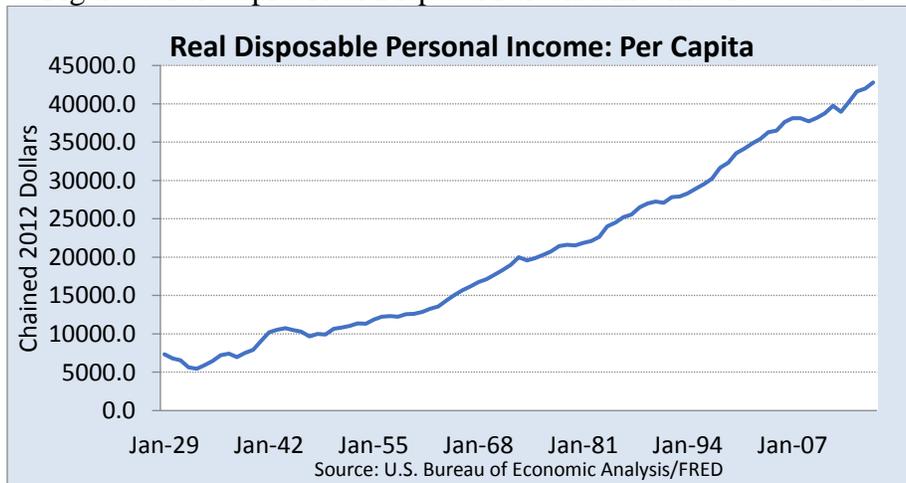
## DATA SOURCES

The annual data for quantities and prices for broiler chickens and prices for beef and pork are available from the National Chicken Council covering from 1975 to 2017 (http://www.nationalchickencouncil.org/about-the-industry/statistics/). Although many different income time series are available, annual per capita real disposal personal income data that is available from FRED is employed for this study (http://research.stlouisfed.org/fred2/series/A229RX0/). This site contains a spreadsheet with quantity and price data for broiler chickens plus data for beef and pork prices and disposal income, all on an annual basis. Descriptive statistics for all variables used in this study are presented in Table 1.

Table 1. Descriptive Statistics for All Variables

| Variable Description | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|
| $Q_{broiler}$ | 66.82 | 16.61 | 36.00 | 90.10 |
| $P_{broiler}$ | 133.73 | 47.16 | 59.70 | 196.70 |
| $P_{beef}$ | 332.41 | 129.31 | 145.70 | 628.9 |
| $P_{pork}$ | 242.16 | 75.53 | 125.40 | 402.00 |
| Inc | 28,779.95 | 6,598.96 | 18,613 | 39,155 |

$Q_{broiler}$ = annual per capita consumption of broiler chickens in pounds
$P_{broiler}$ = annual broiler chickens retail price (cents per lb. on a retail weight basis)
$P_{beef}$ = annual beef retail price (cents per lb. on a retail weight basis)
$P_{pork}$ = annual pork retail price (cents per lb. on a retail weight basis)
Inc = annual per capita real disposal personal income (chained 2009 dollars)

## BRIOLER CHICKEN DEMAND MODELS

Specifically, elasticity expresses the percentage change in the quantity of one variable that results in response to a one-percent change in another. Demand elasticity is based on the assumption that consumers choose to purchase quantities of goods in a manner that simply brings the most satisfaction for their money. In more technical terms, this is called utility maximization, subject to a budget constraint (i.e., income) and a given set of market prices. This maximization yields an equation for each good purchased that indicates that each particular quantity demanded by the

consumer is determined by the prices of all goods considered and the consumer's income. These equations are called the consumer's ordinary demand equations. For the $i^{th}$ good, the demand equation is given by:

$$q_i = f(p_1, p_2, \text{---}, p_n, I)$$

In this equation, $q_i$, is the total quantity of good i demanded by the consumer at prices $p_1$, $p_2$, ---, $p_n$, for goods $q_1$, $q_2$, ---, $q_n$, respectively, and I is the consumer's income. In practice, economists usually estimate elasticities, including own price elasticity of demand, cross price elasticity of demand, and income elasticity of demand, based on market demand. The equation for the market demand for a good, that is, the amounts demanded by all consumers at various prices holding all other prices and income constant, results from summing all the demand equations of individual consumers. Empirically, Ordinary Least Squares (OLS) regression techniques can be used in this study to look for a linear or logarithmic relationship of the general form:

$Q_{broiler} = f(P_{broiler}, P_{beef}, P_{pork}, Inc, Trend)$

where $Q_{broiler}$ is per capita consumption of broiler chicken meat, P is the retail prices of broiler chickens, beef, and pork, Inc is real disposable income, and Trend variable (1, 2, 3, …, n).

## LINEAR REGRESSION MODEL

Empirically, the base model in this study specifies the broiler chicken consumption as a function of the broiler chicken price and income in the linear regression form to model their relationship as follows: $Q_{broiler} = \beta_0 + \beta_1 * P_{broiler} + \beta_2 * Inc + \beta_3 * Trend + \varepsilon$

where  $Q_{broiler}$  = annual per capita consumption of broiler chicken in pounds

$P_{broiler}$  = annual broiler chicken retail price (cents per lb. on a retail weight basis)

Inc      = annual per capita real disposal personal income (chained 2009 dollars)

Trend  = trend variable (1, 2, 3, …, n)

$\varepsilon$        = error term

Table 2. Linear Regression Results – without Beef and Pork Prices

| Parameter | Linear Model | | Double-Log Model | |
|---|---|---|---|---|
| | Estimate | S.E. | Estimate | S.E. |
| Intercept | -14.290 | (11.698) | -9.910*** | (2.050) |
| $P_{broiler}$ | 0.162*** | (0.034) | 0.278*** | (0.044) |
| Inc | 0.003*** | (0.001) | 1.268*** | (0.214) |
| Trend | -0.621 | (0.382) | -0.012** | (0.0004) |
| R-Squared | 0.970 | | 0.980 | |
| Adj. R-Squared | 0.967 | | 0.978 | |
| S. E. of the Estimate | 3.0019 | | 0.0399 | |
| Durbin-Watson | 0.703 | | 0.964 | |

Notes: Figures in parentheses are standard errors. 0"***" 0.001"**" 0.01"*" 0.05"."

Empirical results of the linear regression for the broiler chickens are presented in Table 2. Note that the elasticity value of the linear regression model follows that the slope (the unit change in quantity/the unit change in price) is multiplied by the ratio of the average mean values of quantity and price. Thus, own price elasticity of broiler chickens (Table 3) is computed as:

$\text{Own-}\hat{E}_{broiler} = \beta_1 * \text{mean}(P_{broiler}) / \text{mean}(Q_{broiler}) = 0.162 * 133.73 / 66.82 = 0.324$

When own price elasticity of broiler chickens is estimated with only two variables, quantity and price, with the linear regression model, the value of 0.324 is obtained. It indicates that consumers are more likely price sensitive, and a 1% increase in the price of broiler chickens leads to a 0.324% increase in the quantity of broiler chickens. Most commonly, the elasticity is calculated at the "point of the means" because it is a representative point on the regression line. Similarly, income elasticity is a useful way to characterize the responsiveness of consumer expenditure to change in income. The income elasticity (Table 3) can be calculated at the point of the mean:

$\hat{E}_{inc} = \beta_2 * \text{mean}(Inc) / \text{mean}(Q_{broiler}) = 0.003 * 28,779.95 / 66.82 = 1.292$

This estimated income elasticity takes its usual interpretation. It can be estimated that a 1% increase in annual real disposal personal income will lead, on average, to a 1.292% increase in annual personal expenditures on broiler chickens, when real disposal personal income and per capita consumption of broiler chickens take their sample mean values. Since the estimated income elasticity is greater than one, therefore, broiler chickens could classify as a normal good, an increase in income causes an increase in demand for broiler chickens.

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Table 3. Own Price and Income Elasticities – without Beef and Pork Prices

| Elasticity | Linear Model | Double-Log Model |
|---|---|---|
| Price elasticity | 0.324 | 0.278 |
| Income elasticity | 1.292 | 1.268 |

One of the properties of this log-transformed function is that the estimated coefficients are direct estimates of elasticity for their corresponding variables (Moore, 1924). Thus, double-log demand function is compared to model the relationship between quantity and price of broiler chickens as follows:

$LogQ_{broiler} = \beta_0 + \beta_1*LogP_{broiler} + \beta_2*LogInc + \beta_3*Trend + \varepsilon$

Thus, when the price elasticity of broiler chickens is estimated using only two variables, quantity and price, the log-log model value is 0.278. This indicates that consumers are more price sensitive, and a 1% price increase for broiler chickens will result in a 0.278% increase in the quantity of broiler chickens demanded. Similarly, it also shows that a 1% increase in annual real disposal personal income will lead, on average, to a 1.268% increase in annual personal expenditures on broiler chickens, and broiler chickens could classify as a normal good, for an increase in income causes an increase in demand for broiler chickens as well.

**MULTIPLE REGRESSION MODEL**

A standard linear and double-log demand functions are estimated using multiple regression to model the relationship between quantity and prices of broiler chickens, beef, pork, and disposal income as follows:

$Q_{broiler} = \beta_0 + \beta_1*P_{broiler} + \beta_2*P_{beef} + \beta_3*P_{pork} + \beta_4*Inc + \beta_5*Trend + \varepsilon$

where $Q_{broiler}$ = annual per capita consumption of chicken broiler in pounds

$P_{broiler}$ = annual chicken broiler retail price (cents per lb. on a retail weight basis)

$P_{beef}$ = annual beef retail price (cents per lb. on a retail weight basis)

$P_{pork}$ = annual pork retail price (cents per lb. on a retail weight basis)

Inc = annual per capita real disposal personal income (chained 2009 dollars)

Trend = trend variable (1, 2, 3, …, n)

$\varepsilon$ = error term

Table 4. Multiple Regression Results – with Beef and Pork Prices

| Parameter | Linear Model | | Double-Log Model | |
|---|---|---|---|---|
| | Estimate | S.E. | Estimate | S.E. |
| Intercept | 14.128 | (11.960) | -10.668*** | (2.408) |
| $P_{broiler}$ | 0.117*** | (0.032) | 0.294*** | (0.046) |
| $P_{beef}$ | -0.007 | (0.0152) | 0.110 | (0.078) |
| $P_{pork}$ | -0.093* | (0.036) | -0.123 | (0.128) |
| Inc | 0.002** | (0.001) | 1.343*** | (0.228) |
| Trend | 0.591 | (0.431) | -0.014* | (0.006) |
| R-Squared | 0.980 | | 0.981 | |
| Adj. R-Squared | 0.977 | | 0.978 | |
| S. E. of the Estimate | 2.531 | | 0.040 | |
| Durbin-Watson | 0.887 | | 1.080 | |

Notes: Figures in parentheses are standard errors. 0"***" 0.001"**" 0.01"*" 0.05"."

Empirical results of the multiple regression for the broiler chickens are presented in Table 4. Own price elasticity of broiler chickens is computed as:

$$\text{Own-}\hat{E}_{broiler} = \beta_1 * \text{mean}(P_{broiler}) / \text{mean}(Q_{broiler}) = 0.117 * 133.73 / 66.82 = 0.234$$

From Table 5, the own price elasticity was found to be 0.234, which was significant at $p < 0.0001$. Price of broiler chickens exhibited its expected positive sign showing a positive relationship between broiler chickens and its price, implying that increase in price of broiler chicken leads to increase in broiler chicken consumption. The cross-price elasticity of demand measures the relative responsiveness of quantity demanded of a particular commodity to changes in the price of a related commodity. Here, commodities are related as substitutes or complements depending on the sign of the value of cross-price elasticity. Positive and negative elasticities imply that commodities are substitutes and complements, respectively.
Cross price elasticity for beef is computed as:

$$\text{Cross-}\hat{E}_{broiler} = \beta_2 * \text{mean}(P_{beef}) / \text{mean}(Q_{broiler}) = -0.007 * 332.41 / 66.82 = -0.035$$

Cross price elasticity for pork is computed as:

$$\text{Cross-}\hat{E}_{broiler} = \beta_3 * \text{mean}(P_{pork}) / \text{mean}(Q_{broiler}) = -0.093 * 242.16 / 66.82 = -0.337$$

From Table 5, the cross price elasticities for beef and pork was -0.035 and -0.3370 in the linear model, respectively. The negative signs confirm that broiler chickens and beef and pork are complements, meaning that an

increase in the price of broiler chickens cuts down its consumption and consequently the consumption of beef and pork. In the double-log model, the positive sign of the cross price elasticity for beef showed that broiler chickens and beef are substitutes, not complements.

Table 5. Own Price, Cross Price and Income Elasticities – with Beef and Pork Prices

| Elasticity | Linear Model | Double-Log Model |
|---|---|---|
| Price elasticity | 0.234 | 0.294 |
| Cross elasticity (Beef) | -0.035 | 0.110 |
| Cross elasticity (Pork) | -0.337 | -0.123 |
| Income elasticity | 0.861 | 1.343 |

The income elasticity of demand is the relative responsiveness of quantity demanded to changes in income. The income elasticity can be calculated at the point of the mean:

$\hat{E}_{inc} = \beta_4 * mean(Inc) / mean(Q_{broiler}) = 0.002 * 28{,}779.95 / 66.82 = 0.861$

From Table 5, income elasticity was found to be 0.861 in the linear model and 1.343 in the double-log model, respectively. Since the value of income elasticity is positive, it suggests that broiler chicken is a normal good and that people will prefer broiler chicken and increase their consumption of it when there is an increase in personal income.


## RESULTS AND DISCUSSION

The historical consumption of broiler chickens indicates that chicken has become the dominant source of meat products in the United States. The increases in effective and efficient production of broiler chickens have resulted in lower consumer prices compared to beef or pork. Consumer demand for broiler chicken products has remained high regardless of price increases observed. Consequently, the increased consumption of broiler chicken supports the sustainable development goal of "Responsible Consumption and Production."

## CONCLUSIONS

This paper attempts to answer the call from the United Nations to universities and scholars to generate research, which contributes to their

sustainable development goals. Significant improvements were identified related to the effective and efficient production of broiler chickens.  Over the last few decades, the production time required for broiler chickens decreased by 25% and the feed required decreased by 61%. This has resulted in a lower priced alternative when compared to beef and pork. Regardless of personal income levels and the various types of price elasticities investigated, positive consumer response has significantly increased the consumption of broiler chicken meat in the United States. These improvements provide support or the sustainable development goals of "Responsible Consumption and Production,"  "Clean Water and Sanitation," "Climate Action," and "Life On Land."  Furthermore, in support of the sustainable development goal of "Good Health and Well-Being" a long-term increase in the consumption of comparatively healthier chicken broiler meat was found, as well as the long-term decrease in the consumption of pork and beef.

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# THE IMPACT OF JAPANESE ATTITUDES ON PURCHASES OF U.S. FRUIT

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**ABSTRACT**
Access to foreign markets is increasingly critical to the U.S. as global competition increases. Past efforts by the U.S. to penetrate the Japanese market have often focused on overcoming formal trade barriers including tariffs, quotas, and product standards. Although this form of intervention has enjoyed success, limited effort has been devoted to analyzing informal trade barriers. This study examines informal trade barriers in terms of attitudes of Japanese consumers toward U.S. products. The study focuses on a product-market for which Japan is the leading single-country importer for the U.S.: fruit. Recent inroads into the Japanese market by other countries have eroded the position of the U.S. This erosion will continue unless U.S. exporters can develop appropriate strategies based on sound market intelligence. The study reveals that Japanese attitudes toward U.S. fruit consist of health issues, aesthetic appearance, in-store inspection, and second choice. Further, the study reveals that the health and appearance attitudinal factors are significantly related to intentions to purchase fruit which are then related to purchase behavior.

**Keywords:** Fruit, Attitude, Japanese, Purchase Behavior

## INTRODUCTION

Access to foreign market expansion is increasingly critical to the U.S. in the era of globalization. A particularly important export market to the U.S. is Japan. Japan is the largest net importer of food products in the world and the third largest market for U.S. agricultural products (U.S. Agriculture Trade Office, Tokyo 2009). Efforts to penetrate the Japanese market in the past have focused on overcoming formal trade barriers including tariffs, quotas, and product standards. As this direct form of intervention has now reaped some important benefits, progress has slowed and alternative avenues of intervention may be expedient. More successful penetration of the Japanese market may now depend upon overcoming informal trade barriers (Spencer and Qiu 2001; Phelan 1996). This study examines informal trade barriers in terms of the attitudes of Japanese consumers toward U.S. products. Informal trade barriers in Japan, manifested in unfavorable attitudes toward imported products, are thought to be more difficult to deal with than formal barriers (Gehrt, Lotz, Shim, et al. 2005; Samiee and Mayo 1990). This study focuses on the attitudes of Japanese consumers toward a product for which they are the leading

single-country importer for the U.S.; fruit. The attractiveness of the Japanese market to U.S. fruit exporters is enhanced by the declining self-sufficiency of Japanese fruit growers (U.S. Department of Agriculture, Foreign Agricultural Service 2009). Despite this favorable situation, recent inroads by exporters from China, Russia, Chile and other countries have eroded the position of the U.S. (U.S. Department of Agriculture, Foreign Agricultural Service 2009). These new competitors will continue to carve out a significant share of the Japanese market as well as the overall Asian market unless U.S. exporters can develop appropriate strategies based on sound market intelligence.

## PURPOSE, OBJECTIVES, SIGNIFICANCE OF THE STUDY

The general purpose of this study is to assess the informal, attitudinal barriers that exist in Japanese consumer perceptions of U.S. products. Specific study objectives include determining the salient attributes of U.S. fruit to Japanese consumers, the relationship between attitudes and behavioral intentions, and the relationship between behavioral intentions and purchase behavior. The study will also identify demographic factors that are related to the salient attitudes. The first issue, determining salient attributes of U.S. fruit to Japanese consumers is exploratory in nature. Exploratory factor analysis will be used to identify the attribute themes that underlie Japanese consumers' attitudes toward U.S. fruit exports. The second issue relates to the first of the study's hypotheses:

**H1:** Japanese consumers' attitudes will affect their intentions to consume imported U.S. fruit.

The third issue relates to the second of the study's hypotheses:

**H2:** Japanese consumers' intentions to consume imported U.S. fruit will affect their actual purchase behavior related to U.S. fruit.

What is perhaps most significant about this theory based inquiry is that it is designed to provide practical managerial implications. The results will help to guide U.S. exporters to devise marketing strategies, informed by the study's attitudinal findings, to more effectively overcome informal trade barriers among consumers in Japan and elsewhere.

## LITERATURE REVIEW

### Fishbein Attitude-Behavioral Intention Model:
Attitude is the learned predisposition to react consistently, favorably or unfavorably, toward a stimulus (Engel, Blackwell, and Miniard 2005). The Fishbein attitude-behavioral intention model is a tool that examines the influence of evaluations and beliefs (attitudes) on behavioral intentions and on actual behavior (Fishbein and Azjen 1975). The multi-attribute nature of the model

provides diagnostic utility by making it possible to identify attributes of consequence (ei) and the degree to which a product is perceived to provide those attributes of consequence (bi). The model has been useful in understanding consumer behavior across cultures (Kim, Ko, Takahashi, et al 2009; Oetzel, Garcia, and Ting-ToomeyLee 2008). The attitude-behavioral intention model's ability to predict behavioral intention has been widely tested and it has been a successful predictor in many situations, including a collectivist culture (Park, Blenkinsopp, Oktem, et al. 2008). The model has successfully predicted attitudes and the intention to consume agricultural products (Pollard, Miller, Woodman, et al. 2009; Zey and McIntosh 1992), as well as high tech products (Weir, Douglas, Carruthers, et al 2009), online banking (Polasik and Wisniewski 2009), tobacco (Shiu, Hassan, and Walsh 2009) and a wide array of other products and ideas.

## Japanese Consumers and Distributors:

Large Retail Store laws in Japan have resulted in an increase in the number of superstores and supermarkets (Japan-U.S. Working Group 1991). Large supermarkets have employed techniques that have allowed them to gain power relative to manufacturers and wholesalers in the distribution channel, including sourcing from overseas suppliers to a greater extent (Anwar and Taku 1993; Riethmuller 1996). Japanese consumers often tend to regard fruit as less of a staple food and more as a luxury item, reserving fruit for dessert or for gift-giving (Bestor 1988). With regard to gift-giving, fruits are important gift items and compete with prepared foods such as cakes, confectionery, Japanese red-bean sweets, dried seafood, various other food products, and a relatively limited array of nonfood items (U.S. Agricultural Trade Office, Tokyo 1995). Fresh fruit is also consumed by Japanese consumers as a snack and is facing stiff competition from other snack items such as cakes and sweets (Gehrt and Shim 2002).

## METHODOLOGY

### Instrument Development:

Two eight-person focus group interviews were conducted with consumers, one in Tokyo and one in Yokohama, to inform subsequent instrument development efforts. A focus group interview and personal interviews were also conducted with channel members. The focus group consisted of seven Japanese fruit wholesalers who were associated with Tsukiji Market, Japan's largest food wholesaling facility. Twelve personal interviews consisted of session with 1) four upper-level supermarket executives from Ito Yokado, 2) three supermarket store managers from Jusco, 3) two upper level managers with Dole, Japan 4) two senior level U.S. Embassy agricultural attaches, and 5) the head Japanese liaison for a U.S. trade association for fruit. The interviews suggested that oranges would be a fruit of particular interest since most consumers were very familiar with them and they were a fruit from the U.S. that Japanese consumers were generally willing to consider for purchase due to the orange's thick skin. Japanese focus group respondents felt that fruits with thick skins are less susceptible to bruising and

contamination from agricultural chemicals. The interviews suggested that there were both intrinsic (i.e., taste, juiciness) and extrinsic (i.e., country of origin, organic certification) attributes of salience for oranges. A total of 23 consumer attributes were identified as a result of the interviews. The face validity of the survey instrument was assessed via collaborative discussion between 1) Japanese and American principal investigators, 2) a Japanese business practitioner, and 3) a Japanese MBA translator.

**Questionnaire Construction:**
Fishbein's attitude-behavioral intention model was adopted in measuring 1) evaluations of salient attributes (ei) of U.S. apples, 2) attribute beliefs (bi) of U.S. apples, 3) behavioral intentions to purchase (BI), and past purchase behavior regarding U.S. apples (B). Data related to respondent sociodemographics was also gathered in order to assess the representativeness of the sample and profile attitudinal factors. A pretest for of the questionnaire was conducted to identify potential problems with instrument ambiguities. A total of 50 consumers drawn from three supermarkets in Tokyo completed the questionnaire. Respondents were debriefed upon completion of the questionnaire. The debriefings indicated that only minor modifications of the instrument were necessary.

**Sample:**
A two-step sampling method that is commonly used in Japanese consumer research was used to elicit responses from Japan's seven largest metropolitan areas. The Tokyo and Osaka areas alone are considered to be representative of consumption behavior in Japan (US ATO, Tokyo 1995) which is much more highly urban compared to the U.S. Individuals were first prescreened via a two-way postcard. The request was made to 3000 households divided as follows: Tokyo and surrounding areas (30%), Osaka and surrounding areas (20%), Sendai (10%), Sapporo (10%), Nagoya (10%), Hiroshima (10%), and Fukuoka (10%). 957 respondents agreed to participate and 808 ultimately returned a completed questionnaire within the requested two week's time. Each respondent received a 500 yen telephone card with the logo of a major U.S. university. Gift incentives are a traditional incentive for mailed surveys in Japan (Gehrt and Shim 2002; Sapp and Jensen 1997).

## DATA ANALYSIS

A two-stage data analysis procedure was employed. In the first stage, exploratory factor analysis was performed to identify the dimensionality of Japanese consumers' attitudes toward consuming U.S. apples. Responses to the 20 fruit attribute statements were factor analyzed (Table 1a). Measures examined to determine the number of factors to interpret were the percentage of variance explained and eigenvalues. Statement loadings on a factor that are greater than .50 are considered moderately meaningful, and greater than .70 highly meaningful (Hair et al. 2010). Varimax extraction was chosen due to its tendency to provide an easily interpretable factor matrix (Kim, Mueller 1982). Orthogonal rotation was chosen because the factor matrix was to be subjected to subsequent data analysis (Hair et al. 2010). Cronbach's alpha was computed to assess the reliability of each factor. In the second stage, attitude factor scores were saved and correlation analysis was performed to determine whether Japanese consumer's attitude factors affect their consumption intentions (H1). Next, correlation analysis was performed to determine whether Japanese consumers' intentions affect their actual U.S. fruit consumption behavior (H2).

**Table 1a.** Constructs and Items

| Construct | Coefficient Alpha | Standardized Loading |
|---|---|---|
| General Product | 0.84 | |
| *Fresh* | | 0.82 |
| *Juicy* | | 0.72 |
| *Pure* | | 0.73 |
| *Healthy* | | 0.81 |
| Pedigree | 0.77 | |
| *Organic certification* | | 0.69 |
| *Organically grown* | | 0.70 |
| *Post harvest residue, wax* | | 0.78 |
| *BLIX* | | 0.71 |
| Appearance | | |
| *Good Color* | | 0.94 |
| *Lack of blemishes* | | 0.95 |
| *Good shape* | | 0.77 |
| *Size* | | 0.81 |
| Chi-square = 178.92 | Degrees of freedom = 124 | P = 0.00092 |
| GFI = 0.91 | NFI = 0.97 | RMSEA = 0.043 |

**Table 1b.** Rotate Component Matrix

| | Health Attributes Factor | Aesthetic Appearance Factor | In-Store Inspection Factor | Second Choice Factor |
|---|---|---|---|---|
| *Coefficient Alpha* | *0.913* | *0.784* | *0.691* | |
| If I purchase U.S. apples, how likely is it that they will: | | | | |
| Be a good color | | 0.772 | | |
| Be a perfect shape | | 0.727 | | |
| Be large | | 0.659 | | |
| Be free of blemishes | | 0.710 | | |
| Be sweet | | 0.645 | | |
| Be organically certified by the country or region of origin | 0.721 | | | |
| Be safe from pesticides and chemicals | 0.889 | | | |
| Be fresh | 0.837 | | | |
| Be juicy | 0.625 | | | |
| Be available for tasting prior to purchase | | | | |
| Be familiar to me | 0.506 | | | |
| Be packaged in the quantity I need | | | 0.565 | |
| Have a thick stem | | | 0.680 | |
| Have a good smell | | | 0.549 | |
| Be heavy in weight | | | 0.713 | |
| Be safe from post-harvest residue | 0.884 | | | |
| Be healthy | 0.763 | | | |
| Be identified by a region of the country | 0.533 | | | |
| Be organically grown | 0.790 | | | |
| Be purchased merely because my favorite apples are out of season | | | | 0.830 |

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normailzation
Rotation converged in 6 iterations

## RESULTS

**Fruit Attitude Attributes:**

Factor analysis of the 20 fruit attribute statements yielded three multi-statement factors/summary attributes with an eigenvalue > 1.00 explaining 60 percent of the variance. These factors were comprised of at least four statements which loaded on a single factor at > .50. There was also a single statement factor (.830 loading). The factor solution explained 60 percent of the variance and is shown in Table 1b. Cronbach reliability coefficients were calculated for each multi-statement factor. The solution's KMO measure of sampling adequacy was .907, with measures > .800 being considered a high standard. Bartlett's test of sphericity was 4870 (df =190) which was significant at the .000 level, indicating that the assumption of multivariate normality was met (Norusis 2005). Table 1b shows that interpretation of the fruit attribute factors was straightforward. They included Health Attributes, Aesthetic Appearance, In-store Inspection, and Second Choice.

***Health Attributes Factor.*** The first factor to emerge consisted of nine statements. The highest loading statements included "safe from pesticides and chemicals" (.889), "safe from post harvest residue" (.884), "freshness" (.837), "organically grown" (.790), "healthy" (.763), and "organically certified" (.721) (Table 1b). Two of the statements, "identified by region of country" (.533) and "familiar to me" (.506) related to the provenance of the fruit. The factor accounted for 28 percent of the variance and had a Cronbach reliability coefficient of .913. The Health Attribute Factor accounts for more variance than any of the factors and it is, therefore, an important concern for U.S. exporters. The age demographic was significantly related to this factor (Table 2). It was a positive relationship suggesting that the importance of the Health Attributes Factor increased with age.

***Aesthetic Appearance Factor.*** The second factor to emerge consisted of five statements. The four highest loading statements related directly to the appearance of the fruit ("good color" (.772), "perfect shape" (.727), "free of blemishes" (.710), "large" (.659). The Appearance Factor accounted for 14 percent of the variance and had a Cronbach reliability coefficient of .784. All of these statements relate to the core product. This quantitative finding is consistent with the focus group results as well as with the widespread belief that "the Japanese eat with their eyes" (CNN 2017). Demographically, the Aesthetic Appearance Factor was significantly related to occupation (non-professional), education (negative relationship), marital status (single), and income (positive relationship) (Table 2).

***In-Store Inspection Factor.*** The next factor was the In-Store Inspection Factor. It accounted for 11 percent of the variance and had a Cronbach reliability coefficient of .691. All four of the statements that loaded on the factor related to measures taken by Japanese consumers to evaluate fruit during the in-store phase of the selection process that are not squarely related to the aesthetic appearance of the fruit. "Heavy "(.713), "have a thick stem" (.680), "packaged in the quantity I need" (.565), and "have a good smell" (.549) were the constituent statements for the In-Store Inspection Factor. "Have a thick stem" may seem an odd statement but its

inclusion in this factor is corroborated by focus group interviews, consumer and distributor alike, that preceded the quantitative phase of this study. None of the demographic variables were significantly related to this factor suggesting a diffuse demographic profile.

***Second Choice Factor.*** This single statement factor may merit some mention. The statement that loaded (.830) on the factor, "purchased because my favorite apples are out of season", was another sentiment that manifested in the focus group interview phase of the study. Furthermore, the focus group results suggest that the reason U.S. apples occupy this second choice space is largely due to health and safety concerns such as those revealed in the first factor, "Health Attributes". Efforts by U.S. growers to ensure the safety of consuming their produce could help to move U.S. apples out of this space. Of the demographic variables, income was positively related to the Second Choice Factor (Table 2).

**Table 2.** Attitude Factor x Demographic Correlations

|  | Health Attitude | Aesthetic Appearance | In-store Inspection | Second Choice |
|---|---|---|---|---|
| Age | 0.129*** |  |  |  |
| Occupation |  | -0.143*** (non professional) |  |  |
| Education |  | -0.152*** |  |  |
| Marital Status |  | 0.101** (single) |  |  |
| Income |  | 0.123*** |  | 0.007** |

<div align="right">

\* 0.05
\*\* 0.01
\*\*\* 0.000

</div>

**Fruit Attitudes, Purchase Intention, Purchase Behavior:**

Correlation analysis was used to determine whether Japanese consumers' attitude factors were significantly related to purchase intentions. Results showed the Health Attributes Factor and Aesthetic Appearance Factor were significantly related to purchase intentions (Table 3a and 3b). This provides partial support for H1 and for the usefulness of attitude factors as predictors of purchase intentions.

Correlation analysis was also used to determine whether Japanese consumers' purchase intentions were significantly related to purchase behavior. Results showed purchase intentions were significantly related to purchase behavior (Table 3a and 3b). This provides support for H2 and for the usefulness of measurement of purchase intentions as predictors of purchase behavior.

**Table 3a.** Confirmatory Factor Analysis

| Independent Latent Variable | Puechase Intention | Purchase Behavior |
|---|---|---|
| General Product | 0.48 (t-value = 4.48) | |
| Pedigree | -0.21 (t-value = -2.40) | |
| Product Appearance | 0.26 (t-value = 2.98) | |
| Purchase Intention | | 0.91 (t-value = 26.82) |
| Chi-square = 170.69 | Degrees of freedom = 124 | P = 0.00091 |
| GFI = 0.9 | NFI = 0.96 | RMSEA = 0.048 |

**Table 3b.** Attitude Factors, Purchase Intention, Purchase Behavior

**Purchase Intension**

| | beta | significance |
|---|---|---|
| Health Attitude | 0.117 | 0.008 |
| Aesthetic Appearance | 0.087 | 0.048 |
| In-store Inspection | | |
| Second Choice | | |

**Purchase Behavior**

| | beta | significance |
|---|---|---|
| Purchase Intention | 0.417 | 0.000 |

**DISCUSSION**

The results of the analysis draw attention to the importance of efforts to overcome informal trade barriers in the form of attitudes that may affect the decisions of Japanese consumers to purchase U.S. fruit. The model shows that not only is there a significant relationship between attitude factors and purchase intentions, but that there is also a significant relationship between purchase intentions and purchase behavior, and also a direct relationship between attitudes and purchase behavior.

These findings indicate that there is substantial efficacy in taking steps to affect Japanese consumers' attitudes toward U.S. fruit. It is often found that intentions are not finally manifested in behavior. This study finds otherwise. The results reveal that there are three multi-item factors that comprise Japanese consumers' attitudes toward U.S. fruit. These include health attributes of the fruit,

aesthetic appearance of the fruit, and in-store inspection of fruit. There was also a single-item factor, U.S. fruit as second choice.

The first two of the multi-item attitude factors were significantly related to purchase intentions. The first of these suggests that Japanese consumers are acutely attuned to product healthfulness concerns related to the fruit that they consume and their perceptions toward the healthfulness of U.S. fruit must be maintained or improved to encourage more extensive imports. The consumer product healthfulness concerns can be de-constructed into matters related to issues such as whether organic methods have been employed to grow the fruit and whether it is free of chemical residue. U.S. exporters should also note that, in interviews, U.S. embassy officials and Japanese channel members advise that citrus fruits, with their thick skins, appear to be less vulnerable to negative consumer health safety perceptions.

The second multi-item attitude factor that was significantly related to purchase intentions was the aesthetic appearance factor. The finding suggests that U.S. exporters should recognize that the provision of the highest visual quality is critical to potential Japanese consumers. U.S. growers could perhaps employ the more labor intensive methods that facilitate optimal fruit appearance such as those of Japanese domestic growers and growers from other countries who export to Japan.

The purchase intentions that are activated by efforts to improve Japanese consumers' attitude factors toward U.S. fruit will then manifest in increased purchases of U.S. fruit by virtue of the significant relationship between purchase intentions and purchase behavior.

## CONCLUSIONS

The study attempts to provide a fuller understanding of informal trade barriers, in the form of attitudinal barriers, faced by U.S. exporters attempting to penetrate the Japanese market. The study first identifies the crucial attitudinal dimensions that are considered by Japanese consumers when they buy fruit. Then, by utilizing the Fishbein model to conceptualize the concept of attitudes, the study demonstrates a significant between attitude factors and purchase intentions as well as between purchase intentions and purchase behavior.

The research shows that, in the current state-of-affairs, health attributes and aesthetic appearance are perhaps the most important consideration, by virtue of their significant relationship with purchase intentions. Thus, maintenance and enhancement of measures that affect these attitude factors provide an avenue to overcome corresponding informal trade barriers among Japanese consumers. Efforts need to be made by U.S. exporters to ensure that products intended for export to Japan measure up with respect to these criteria and that the fact that these standards are met be effectively communicated.

## LIMITATIONS AND FUTURE RESEARCH

This study examines informal trade barriers related to a very specific product category. Although the export of fruit to Japan is an important product category for U.S. exports in general, other product categories should be examined to develop a more complete picture of attitudinally-based informal trade barriers. This could include other food products as well as non-food items. An understanding of the similarities as well as the differences between products would help exporters to triangulate on the critical attitudinal trade barriers with which they are confronted.

Besides exploring other product categories, other countries could also be examined. Although Japan remains an important export target for the U.S., a country such as China is likely to be of interest, at a minimum, due to its sheer size as a U.S. export target. Western as well as Asian countries should certainly be examined. Further, the concept of values could be incorporated in the investigation. It is possible that the value differences that exist between Asian and western societies could provide a useful means of explaining attitudinal informal trade barrier differences between groups of countries.

Finally, this cross-sectional study provides a current state-of-affairs analysis of trade barriers. Longitudinal research could examine attitudinal informal trade barriers over time. This could help to determine the impact of sustained marketing and trade efforts on overcoming barriers.

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# THE MOTHERHOOD PENALTY

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## *ABSTRACT*

Across the world, women earn less than men do. Causes for this stem from every aspect of a woman's life, including career choices, reasons for them, societal perceptions of women and men, and the motherhood penalty. The motherhood penalty affects women in such a way that they cannot recover from the lost income to be on parity with men.

Initiatives exist to help women into more traditionally male-dominated better-paying careers or positions, but because being a mother takes time, the motherhood penalty persists. This paper examines the motherhood penalty. It first identifies the glass-ceiling and some reasons for its existence. The paper then examines the motherhood penalty and its causes. Finally, the paper investigates how different industrialized nations approach motherhood, and how some initiatives succeed at decreasing the size of the motherhood penalty, while others perhaps just make the stress of juggling a career and motherhood more manageable.

Key words: Motherhood penalty, family leave, gender gap, inequality, work policies.

## INTRODUCTION

Researchers have well documented the existence of the glass ceiling, a transparent barrier for women (and minorities) to achieve work-place parity with the white male (Chernesky, 2003, p.13). The causes of the glass ceiling are complex, and researchers cite many reasons for its existence. Some describe it as a "vertical form of job sex segregation, and as such can be influenced by the same allocative processes" (Fernandez & Campero, 2017, p. 74). The initial screenings of employees in fields such as tech stops women before they have the chance to enter into the workplace and ascend through the ranks. Researchers also point out the idea of the "sticky floor," which means women at the bottom of the ranks are most discriminated against when it comes to promotion within an existing company (Fernandez & Campero, 2017, p. 75). Then, the lack of women in higher positions in the tech world means people who appreciate the soft-skills and what a woman candidate brings to the company are not there to advocate properly for her. Of course, seemingly-contradictory evidence exists. According to Srivastava &

Sherman (2015), women who do manage to work up the ranks do not necessarily do anything to promote more women, they are just cogs in the machine. Perhaps that which is necessary to move up the ladder does not favor growth outside the workplace norms.

If women do work their way up, "women managers receive lower organizational rewards such as salary and promotions than men," and the gender of decision makers does not change the outcome of those promotions, indicating all genders are influenced by "social and organizational contexts" (Chernesky, 2003, p. 13). Over time, the gender wage-gap changes, but women managers in 2000 were fewer relative to men than in 1995, although salary gaps narrowed in medicine, education, and public administration (Chernesky, 2003, p. 14).

Considering education, while more women may be attending university today, significantly more women earn degrees in humanities, while men earn more degrees in sciences. Even within disciplines, Marianne Bertrand (2018) points out that men born around 1950 typically earn 14% more than women of the same age cohort (p. 211). Bertrand's research highlights that women appear to value flexibility in a job more than men, who are generally willing to work long, inflexible hours (Bertrand, 2018, p. 215). Finally, the historical gender norms, where men earn more and have more authority than women, still lurk in the background, regardless of how progressive a society is.

Flory, Leibbrandt, and List (2015) point out that young women are particularly more risk-averse than men, and fewer in number in extremely-competitive, high-uncertainty fields and jobs with wage uncertainty (p. 152).Far fewer women choose jobs where at least 50% of the wage is competition based than jobs where competition determines 22% of the wage.

Looking at university professors, one reason for the glass ceiling appears to be that women are expected to do more service-oriented job tasks. Babcock, Vesterlund, and Weingart (2016) find women are asked to perform service more, and men receive more freedom to do research-oriented, promotable tasks (p. 715). In a mixed-gender setting, women volunteer more for low promotability tasks as they perceive men less likely to volunteer.

At the same time, research by Bell, Susato, Baldwin and Holloway (2014) indicates that for women who have broken through the glass ceiling, gender disparity may not exist. The researchers found that in Texas business schools, the genders have achieved pay parity. Despite the pay parity, male faculty outnumber females by a ratio of 3:1. Looking further, this means there are fewer women administrators. As much university administration comes from inside talent, a lack of women on faculty means fewer women rise through the ranks. Women administrators appear to be less likely to gain employment at larger institutions with higher wages, thus maintaining the pay-scale disparity between people doing the same job (Bell, Susato, Baldwin, & Holloway, 2014).

Considering environment, all members of the society carry the burden of the past prejudices and expectations. Bursztyn, Fujiwara, & Pallais (2017) ask the question if "single women avoid career-enhancing actions because these actions signal undesirable traits, like ambition, to the marriage market" based on

observations that married female-identified MBA students participate more than unmarried female-identified students (p. 2390). In parts of the grade visible to the entire class, unmarried female students have lower participation rates and lower grades. In parts of the grade unobserved by classmates like exams, unmarried women perform similarly to the rest of the class (Bursztyn et al., 2017, p. 2388).

Another aspect of supply side gender wage discrimination is the unconscious biases of the people seeking entrance into these fields. Female-dominated industries tend to be lower-paying fields, and yet women continue to choose them (Correll, 2004, p.95). Fields such as education are thought of as better for families, when in fact they have less schedule flexibility than better-paying, traditionally-male dominated fields (p. 95). In Correll's study published in 2004, students were asked to complete a task. Some groups were told that men were better at the task than women, some were not. With a male advantage, men estimated their performance better and said they only needed to achieve 79.9% correct to be competent, while women demanded 89.9% correct. When there was no male advantage, men didn't permit themselves such a low score, and when the task was gender neutral, there was no difference. Demands stayed about the same for women, while for men, they moved. Therefore, women may not be affected by male advantaging, or it may be so pervasive in society as to always be present. However, males respond to male advantaging, ensuring more male candidates in fields regarded as traditionally male.

Finally, beginning with the 1960s women's revolution, more women have been encouraged to grow and believe that they can achieve high levels of success, but that definition of success has not evolved. Initiatives exist to help girls have confidence in math and science so they might choose related occupations, but this makes women's progress asymmetric. Men are not encouraged to pursue jobs related to child-rearing, nor is the devaluing of professions considered traditionally female changing (England, 2010, p. 151). Furthermore, while women appear to have achieved parity in many high-education, high-earning fields, but that parity does not extend into blue collar work (England, 2010, p. 157). The asymmetry also exists outside the work environment. Women wear pants today more than they did in the 1960s, but men do not wear skirts more. In a heteronormative couple, traditionally men still propose marriage, and traditionally women still take their husbands' last names (England, 2010, p. 156).

The differences in wage and work for women from men as groups stems from one biological factor: the potential for motherhood. In 1970, women earned 62% of what men earned, and by 2010, the ratio reached 83% (Glauber, 2018, p. 1664). In 1975, 47% of mothers worked for pay, and by 2015, 70% of mothers were employed (p. 1664). Despite these professional gains, the motherhood wage penalty persists. Mothers, as a group, earn less than men, regardless of whether or not they have children, and less than women without children.

The motherhood wage penalty is multifaceted and complex. This paper will explore the motherhood wage penalty and the costs of the time motherhood takes, the attitudes of the culture towards mothers, and how women with different numbers of children, different types of jobs, and at different points in their careers

are affected. It then goes on to examine workplace policies around motherhood in the US and compares those to in Scandinavian countries and Germany. The implications of government policies regarding motherhood, discussion, and recommendations will follow with a reflection on the most striking aspects on the motherhood wage penalty.

## LITERATURE REVIEW

Many studies examine the evolution of women and mothers in the workforce since the 1965 US census. Work by Benard & Correll (2010), Budig & England (2001), Budig & Hodges (2010), and Waldfolgel (1995 & 1997) demonstrate the wage penalty women pay for having children (Kahn, García-Manglano, & Bianchi, 2014, p. 56). Budig & England (2001) show that parenting and home duties impact a woman's ability to have energy to compete in the labor market and improve her career prospects. While maternity leave impacts women, ongoing parenting and domestic tasks perhaps also affect women's promotability.

Studies by Aisenbrey, Evertsson, & Grunow (2009); Anderson, Binder, & Krause (2003); Baum (2002); Gangl & Ziefle (2009); Jacobsen & Levin (1995) document that women shortening their educations, dropping out of the labor force, cutting back to part-time, passing up promotions for flexibility, and choosing family-friendly jobs all contribute to this motherhood penalty (Kahn et al., 2014, p. 56).

Furthermore, work by Budig & England (2001) as well as research by Benard & Correll (2010) show that young children require more time and energy away from careers, and employers sometimes believe that mothers are less committed and less competent. Although the precise numbers vary between studies, Budig & England (2001) and Anderson et. al. (2003) quantify the wage penalty between 5% and 10% per child in a mother's 20's and 30's. Kahn, García-Manglano, & Bianchi (2014) determine this generally diminishes into a mother's 50's, likely because parenting an older child or grown children require less time, as well. Jee, Misra, & Murray-Close (2019) find that this wage penalty per child actually has increased over time in the US.

Gault, Hartmann, Hegewich, Milli, & Reichlin Cruse (2014) examine the history of US laws around employment for mothers, what kind of leave they can take, how different states do more for mothers, and the effects of federal acts concerning motherhood. Blau & Kahn (2013) speak to specific policies in different countries and how they affect the motherhood wage gap.

Maccarthy (2015) examines Danish laws around motherhood employment. Angelov, Johansson, & Lindahl (2016) looks at longitudinal studies of Swedish couples to quantify the country's motherhood wage gap. Kühhirt & Volker (2012) explore the effects of motherhood in Germany. Finally, Yu & Chen-Lan Kuo (2017) look at a multinational population to consider how the structure of a job contributes to the motherhood wage gap. This research will consider the motherhood penalty in different strata of women and its causes.

## THE MOTHERHOOD PENALTY AND ITS CAUSES

The motherhood penalty is the documented wage decrease that women who are mothers take. Mothers "fare worse in the labor market than women without children and men" (Benard & Correll, 2010, p. 616). According to Budig & England (2001), the motherhood penalty has many causes. First, motherhood takes time. Taking time from work for any aspect of child rearing reduces a woman's experience, professional development, seniority, and human capital in the workforce (Glauber, 2018, p. 1665). Furthermore, when most women become mothers, they take on more traditional tasks at home (Glauber, 2018, p. 1664). With less time or energy to focus on their careers, mothers miss out on advancement (Glauber, 2018, p. 1665). Thirdly, in our society, people, consciously or unconsciously, view mothers as "less competent, capable, and committed than women without children" (Glauber, 2018, p. 1665). The highest wage penalties are for mothers who just returned to work, and these penalties are higher in low-earning jobs than others (Anderson, Binder, & Krause, 2004).

Despite the gains of women in the workforce, the motherhood penalty has held steady, when adjusted for education and experience, since 1986. The latest studies show when controlling for education and experience, for mothers of one child, it has increased from 8% to 14% (Jee, Misra, & Murray-Close, 2019, p. 446). For mothers of two children, the wage gap has held steady between 12% and 13%. For mothers of three or more children, it has remained 17% to 18% (Jee et al., 2019, p. 447). Noteworthy is perhaps one of the reasons the average motherhood wage penalty decreases over time may include simply that more women are in the workplace. Thus, there are more women to take less time off (who lose less human capital and experience,) and they are promoted and have more opportunities (Glauber, 2018, p. 1678).

Examining the motherhood wage penalty from the perspective of high, middle, and low wage earners, it appears that the motherhood wage gap diminished between 1979 and 2005. In 1979, motherhood reduced women's "employment by 21.8 percentage points in 1979 but by only 12.7 percentage points in 2005" (Glauber, 2018, p. 1678). While the gender gap itself diminishes, the inequality among genders increases. High earning women see far less impact of the gender wage gap than low earning women (Glauber, 2018, p. 1678).

Examining the motherhood penalty over time allows a different perspective into the motherhood wage penalty, as well. Kahn, García-Manglano, & Bianchi (2014) examined longitudinal data from the National Longitudinal Study of Young Women. This study considers women born between 1944 and 1954, baby boomers, and follows them from the 1960s until 2003 when they are between 49 and 59 years old, a time that they no longer had young children at home, if they had children at home at all. By this time, 76% of childless women were in the workforce, while 28% of mothers with three or more children worked (p. 62). The occupational penalty declines by the time a mother is in her 50's to much less than it was when she had young children at home (p. 67).

Yu & Chen-Lan Kuo (2017) consider how structural characteristics of a job affect the price women pay for motherhood. They observe that jobs with higher autonomy, less need for teamwork, and jobs with less competitive pressures reduce the job strain for mothers. Mothers in jobs without these characteristics will suffer less personally and less as far as wage penalty than mothers whose jobs have these characteristics (p. 762). Thus, women who have autonomous, non-competitive driven jobs will suffer a smaller wage gap (p. 762). So long as the structural design of these jobs with high motherhood penalty stays the same, mothers will suffer the motherhood penalty in their wages (p. 763).

In the US, the motherhood penalty has evolved since the women's revolution. Some of this has to do with cultural attitudes and the necessity for women and mothers to work. Some of this, though, comes from national workplace policies that regulate treatment of mothers.

## US MOTHERHOOD WORKPLACE POLICIES

Mothers first became legally protected in the workplace in the 1978 with the Pregnancy Discrimination Act (PDA), which prohibits employers from discriminating against a woman, whether an employee or applicant, because of pregnancy or childbirth. It also protects previously unprotected fringe benefits: health insurance coverage, Temporary Disability Insurance, and paid sick days, which are very important for women in regard to childbirth. While the PDA does not mandate that pregnancy leave be paid, the act mandates that if any other medical conditions merit paid leave in a firm, so does pregnancy (Gault, Hartmann, Hegewich, Milli, & Reichlin Cruse, 2014, p. 2). The benefits of this were clear: women were able to keep working when they had children rather than quitting or being fired. Previously women would leave the workforce to have children and return years later (Gault et al., 2014, p. 2).

The Family Medical Leave Act of 1993 mandates parents may take up to twelve weeks of unpaid time off for the birth or adoption of a child or to tend to a family member with a serious medical condition per year (Gault et al., 2014, p. 3). Employees maintain their health insurance, and they return to the same or an equivalent job. This also helps women, caregivers more often than not, maintain employment through any family medical crisis.

At the national level, those are the guarantees in place for employment for parents concerning child rearing. Ironically, some research indicates short maternity leave in the US and Britain allow many women to have less wage loss, if they have the resources to reenter the work force and have additional support for childrearing at home (Kühhirt & Volker, 2012, p. 188). Otherwise American (and British) women lose significant wages when they take time off for a child younger than 6. There is a need for more research into how exactly a women's workload at home changes after the birth of a child (Kühhirt & Volker, 2012, p. 188).

Five states and Puerto Rico have Family Leave Insurance programs that provide wage replacement for workers who take leave to "bond with a new child or care for an ill family member" (Gault et al., 2014, p. 4). California's 2002 Paid

Family Leave program mandates contributions to a State Disability Insurance program from employee paychecks with no cost to employers. When taken concurrently with unpaid FMLA, eligible workers can receive "up to six weeks of wage replacement benefits" at around 55% of the employee's wage, to a maximum of $1,075 per week (Gault et al., 2014, p. 4). Washington State passed a similar law in 2007, but its implementation has stalled because of budget constraints (Gault et al., 2014, p. 4). New Jersey's 2009 Family Leave Insurance functions very similarly, and as of 2014, employees can receive up to two-thirds of the employee's weekly pay (Gault et al., 2014, p. 5). In 2013, Rhode Island created a similar program that allows up to four weeks of wage replacement based on the employee's highest earning quarter for a base period (Gault et al., 2014, p. 5). Looking at US employers, 13% of companies have any kind of paid parental leave (Frankel, 2018, p. 74).

In the European Union, the passage of time does not negate the decline in wage, and the penalty does not necessarily increase beyond the second birth, although the penalty varies by country depending on its policies around motherhood (Abendroth, Huffman, & Treas, 2014, p. 1005). Each country has its own motherhood workplace policies, and the different policies have different effects on the population of mothers. Scandinavian countries and Germany have national policies around mothers in the workplace widely regarded to be particularly forward-thinking. Interestingly, they can have adverse effects, considering the motherhood wage penalty.

## MOTHERHOOD WORKPLACE POLICIES: INTERNATIONAL CONSIDERATIONS

While the US had one of the highest female work participation rates in the Western world, by 2010, most advanced countries surpassed the US (Blau & Kahn, 2013, p. 251). There are reasons for this. Today, the United States is one of eight countries in the world, the only high-income country in this group, that does not legislate paid leave for giving birth (Gault et al., 2014, p. 2.) Beginning with the presence of women in every level of the workforce, several European countries have quotas promoting diversity and inclusion in the corporate sector (Bertrand, 2018, p. 208). Concerning childbirth, most countries mandated paid, parental leave before the Family Medical Leave Act passed in 1993. Outside the US, the industrialized world generally offers public childcare for young children. Additionally, several nations provide systems allowing workers to switch from full-time to part-time employment, making it possible for mothers to continue to earn experience, human capital, and grow in their professional careers (Blau & Kahn, 2013, p. 252). The presence of such policies contributes to the diminishing gender wage gap (Blau & Kahn, 2013, p. 254).

Denmark and Norway have heavily subsidized universal childcare, free kindergarten and education, healthcare, 37-hour workweeks, and flexible time agreements in place for work (MacCarthy, 2015, pp. 18-19). Denmark also has high female participation in government, but women only hold 19.3% of company

board positions. Denmark's neighbor Norway has a quota of 40% for women on boards, Denmark allows each company to set its own plan to increase female participation in leadership. Why does Denmark have lower female participation in the highest paying portion of the private sector, despite mother and woman friendly policies? Experts purport that the reason for lower female leadership in the workforce participation is that women study subjects in university that lead to employment in the public sector, like humanities, instead of fields that lead to more employment in the private sector like science (MacCarthy, 2015, pp. 18-19). The wage gap in Denmark stems reflects the professions women choose for their occupations.

Initially after having a child and returning to work, the motherhood penalty is not apparent in either Denmark or Sweden, likely because of the high childcare subsidy and availability of maternity leave (Kühhirt & Volker, 2012, p. 188). Longitudinal studies of the wages of married couples in Sweden, though, paint a different picture. These studies allow insight into what happens with the wages between a heterosexual family. In Sweden, fifteen years after the first child is born, "male-female gender gaps in income and wages have increased by 32 and 10 percentage points, respectively" within a married couple (Angelov, Johansson, & Lindahl, 2016, p. 545). Swedish parents can reduce their work responsibilities to twenty-five percent until their child turns eight years old (Angelov et al., 2016, p. 549). The gender gap is much smaller for non-parent couples (Angelov et al., 2016, p. 569). Missing from the calculations here is the choices a couple makes about who will spend more time raising the child. Part of the gap appears to be that women whose husbands start out better paid are more willing to take on more home responsibilities and thus make the wage gap larger (Angelov et al., 2016, p. 571).

Germany's Maternity Protection Act allows new mothers time off for six weeks before and up to eight weeks after birth. Parental leave for mothers or fathers can extend up to two years with a parental allowance based on the salary, with fourteen months paid by the government (Maternity and Paternity, 2016). In many ways, this is among the most generous parental leave available in the world. At the same time in Germany, and before the fall of the Berlin Wall, in West Germany there is less public childcare than most of northern Europe and France (Kühhirt & Volker, 2012). Perhaps in part for this reason: women in Germany delay motherhood to consolidate career costs. Women with higher educations have children later, and they expect less of a wage penalty than women in lower earning careers (Gordo, 2009).

German workers incur a loss of 4.8% for each year of maternity leave, but employers may discriminate against mothers to compensate for the expense of the long leave (Kühhirt & Volker, 2012, p. 194) The wage penalty was 16% for 1 child and 29% for 2 (Kühhirt & Volker, 2012, p. 194). Self-sorting by profession does not account for all the wage loss penalty (Kühhirt & Volker, 2012, p. 194). Findings show that a woman in Germany's wage decreases for taking time off to have a child, and after that, her wage decreases 1% per hour of household work per day (Kühhirt & Volker, 2012, p. 194). However, domestic work does not explain all the wage loss (Kühhirt & Volker, 2012, p. 196). Under different

scenarios, the wage penalty for having a child in Germany appears with child at above 10% and then increases over time. The wage disadvantage is most pronounced for mothers of older children (Kühhirt & Volker, 2012, p. 198)

Based on qualitative research, Pedulla & Thébaud (2015) propose that one important part of an egalitarian workplace is workers having egalitarian homes. Germany recently adopted policies to help that equality by having men take greater share of parental leave (Kühhirt & Volker, 2012, p. 199). Germany recently changed from mandating a two-year maternity leave to a one-year income-related benefit that can be extended to 14 months if each parent takes at least 2 months leave (Kühhirt & Volker, 2012, p. 199). Evidence from international research indicates that family-friendly policies help create gender equality in housework, which will have implications in the workforce, both for mother's wages, but also perhaps for gender equality at a grander scale (Kühhirt & Volker, 2012, p. 199).

## BENEFITS OF PAID FAMILY LEAVE TO INDIVIDUALS

The policies embraced by Norway, Denmark, Sweden, and Germany all involve some level of paid family leave. Norway, Denmark, and Sweden have public childcare for young children. Paid family leave increases the number of employees who will return to work after childbirth. It also improves worker morale and family incomes (Gault et al., 2014, p. 7). Several studies show women with paid leave are overall more likely to return to work in the year after giving birth than women without the opportunity for paid leave (Gault et al., 2014, p. 8).

Not immediately quantifiable on an economic scale are the benefits to the future generation of workers when a mother or father spends more time bonding with an infant. The median duration of breastfeeding goes up for workers who have leave, especially paid family leave (Gault et al., 2012, p. 14; Milkman & Applebaum, 2011, p. 7). Breastfeeding and bonding help "stimulate positive neurological and psycho-social development, and strengthen a child's immune system" for life, with lower risks of many chronic diseases (Gault et al. 2012, p. 14). Access to maternity leave reduces infant mortality and increases the likelihood of a baby receiving vaccinations and well-baby care (Gault et al. 2012, p. 14).

## PAID FAMILY LEAVE COSTS AND BENEFITS TO PRIVATE FIRMS AND ECONOMY

A cited issue about employer-provided paid leave is that potential financial burden to the company and thus the overall economy. Since workers with paid family leave are more likely to return to work after the leave, the firm saves the money it would take to find and hire a new employee (Gault et al., 2014, p. 7). While women with paid leave take more time giving birth than women without paid leave, employee retention is significantly greater.

Trzcinski and Finn-Stevenson (1991) examined Connecticut firms that could either provide (unpaid) leave to a worker for childbirth or simply replace the worker. The firms which chose to replace the worker searched for a new employee

for about six weeks, during which they had no employee in place. With a usual leave of six weeks for childbirth, those employers would have saved money had they allowed the employee to return (p. 457). Concerning the potential of a firm to be reduced because of too many employees taking leave at once, a survey of firms that allowed more than six weeks leave for sickness, disability, and maternity asked what percentage of employees took leave in the last year. In firms with less than 50 employees, 3.3% of the full-time work force took leave in a twelve-month period. In firms with 50-99 employees, 3.9% were on leave; in firms with 100-499 employees, 5.4% took leave. In firms with 500 or more employees, 4.9% of employees took leave (p. 457). The same study found that few firms hired replacement workers: 76.9% of small firms hired no temporary workers, of those with 50-99 employees, 94.7% did not hire temporary workers. The worker category most likely filled in was clerical work, where 43.1% of workers had temporary replacements (p. 457). Firms also indicated that they generally did not pay more overtime than usual in dealing with clerical workers on leave, overtime being a way to avoid temporary workers. The range for firms of various sizes that did not incur overtime expenses for a worker on leave was between 66.7% for large firms to 85.7% for firms with 50-99 employees.

Applebaum and Milkman (2011) studied the effects of paid family leave in California. In a five-year survey, employers found it had minimal effect on business operations (p. 4). Additionally, paid family leave had a positive or no noticeable effect on productivity (89%), profitability/performance (91%), turnover (96%) and employee morale (99%) (p. 4). Perhaps counterintuitively, businesses with 100 employees or less were less likely than businesses with over 100 employees to report any negative effects (p. 4). 91% of employers did not witness abuse of the program, and approximately 60% of employers combined their benefit programs with the state PFL program, allowing a cost saving to the business when employees used PFL (p. 4). Results for workplace retention were like the Connecticut study (p. 4). Thus, paid leave either improves or has no effect on workplace productivity (Gault et al., 2014, p. 7). Across the economy, paid leave reduces government spending on public assistance and increases work force participation, all of which grow the economy through participation in work, increase the size of the tax base, and increase the spending ability of individuals (Gault et al., 2014, p. 7).

## IMPLICATIONS, DIRECTION, AND RECOMMENDATIONS

Women have come a long way in the workforce since the gender revolution. In 2010, women became 47% of the US workforce and held many managerial and professional positions (Glauber, 2018, p. 1664). Women in higher positions are more likely to achieve pay parity, and more women in any work environment, regardless of their positions, drive out antiquated gender role behaviors and attitudes (Chernesky, 2003, p.16). The implications of this is that gender wage parity ought to continue to increase.

Even with these strides, the motherhood wage penalty still exists. Mothers, as a group, value flexibility in a job making childrearing, with its many time-devouring aspects, easier. While flexibility exists with higher strata jobs, careers typically associated with women like education, where women are paid less, typically have less flexibility. Steering young women towards jobs with higher flexibility, which exist typically in male-oriented fields, can help. Those positions also generally have better wage parity. Furthermore, some form of paid parental leave for both mothers and fathers help the morale, productivity, and can be a cost saver in a work environment. Paid parental leave for fathers in the first year of a child's life helps make sure that the mother's housework does not increase as much thus helping her wage remain higher.

## SUMMARY AND CONCLUSION

Although women's earnings in the workplace have come a long way, women still face a glass ceiling for many reasons. Women are less likely than men to get jobs, and then when they have them, they are less likely to ascend through a company than men. Women who do manage to work their way up generally receive less compensation and rewards than men, although the wage gap in some fields like medicine or Texas business schools is less significant than in others. Part of the reason for the gender wage gap is that young women are more risk averse and more uncertainty averse than young men. Research also demonstrates that young single women are less likely to engage in behaviors that may make them seem less marriageable, which include masculine-typed traits like open leadership. Historically female-dominated fields are also lower paying and have less flexibility than male dominated fields. Furthermore, male perception of male task advantage makes men more willing to apply themselves, that is, men saturate more fields because they believe they are advantaged in those fields. Traditionally male fields often have better pay, more autonomy, and more flexible work hours, all desirable workplace traits. These traits are particularly desirable for mothers, who pay a wage penalty for their motherhood.

Motherhood takes time away from work, which decreases a woman's wages, human capital, and seniority in the workforce. In a nonegalitarian household, motherhood also causes an increase in household duties, taking women further from work. The motherhood penalty is approximately 5% to 10% per child, but studies show it varies based on field, the mother's initial income, number of children, and where she lives. In some studies, the motherhood wage penalty has decreased over time, and some indicate it has increased over time. Certainly, in the US, more mothers work today than in 1978, when the Pregnancy Discrimination Act made it illegal for employers to discriminate against a woman for being pregnant.

At the national level, the 1978 Pregnancy Discrimination Act made things better for mothers. The 1993 Family Medical Leave Act, allowing people to take up to twelve weeks without pay to care for a family member with a serious medical condition, has improved the situation for women, as well. Five states and Puerto

Rico have Family Leave Insurance programs that provide wage replacement for workers with a new child or who leave to care for an ill family member. While these are gains for American women, the US remains the only country in the industrialized world that does not offer paid maternity leave.

Scandinavian countries and Germany have policies regarding women in the workforce and motherhood and childbirth that can be models for ways to ease the costs and wage penalty of motherhood. Denmark and Norway have universal childcare, free kindergarten, universal healthcare, and flexible work time agreements for mothers. While Norwegian companies have at least 40% women in workplace leadership, Denmark, without quotas, finds itself with women in less than 20% of board positions. Researchers believe this is rooted in what fields educated women enter. Longitudinal studies in Sweden indicate with the similar benefits of the other Scandinavian countries, the opportunity to work quarter-time until their youngest child turns eight creates a motherhood wage gap of 32% in income within a married heterosexual couple. While this result is significant, it misses the calculations a couple makes on behalf of the household as to which parent will take leave. It is logical that the parent with the higher wage will return to work more.

German mothers delay motherhood to consolidate career costs, seeking to acquire experience and human capital before they historically could take up to two years paid leave. In formerly West Germany, the cumulative wage penalty was most pronounced for older children. The revised German policy, allowing 1 year per child that can be extended to 14 months, if the father takes 2 months.

Mothers with paid leave are likelier to return to the workforce after giving birth, which increases the workforce size and tax base. They are also more likely to take longer leave than women with unpaid leave, which bodes well for health outcomes of babies. They have smaller wage penalties for motherhood. Studies of firms in Connecticut and California indicate that mandated leave policies, whether paid or unpaid, have minimal costs to employers, and in fact, raise morale, productivity, and profitability. Over 90% of employees do not abuse the system.

Interestingly, statistics about the motherhood wage penalty do not consider the implications of the cost of childcare. Anecdotally, I have mom-friends who have paid upwards of fifty-percent of their salaries for childcare when their children were young, understanding the time doing that would be limited, but necessary to maintain their professional status. Although making that choice does not help the motherhood wage penalty, subsidized early childcare in the US, like the programs in Scandinavian countries, would lessen the financial burden of motherhood for working moms.

Ultimately, as a group. women are paid less than men. Time off from work from giving birth to a child causes a mother to lose wages and human capital, further lowering her pay. Allowing leave is important to maintaining the size of a workforce, and paid leave for some duration of time can increase morale and productivity, potentially without significant expenses to a firm. There is no perfect solution to th_e motherhood wage penalty, but some form of paid leave for

parenting helps a mother's financial well-being, and that woman's investment of time and nurturing the future creates gains for society at large.

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# IMPROVING PRICE TRANSPARENCY FOR CONSUMER HEALTH CARE SERVICES

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**ABSTRACT**
The purpose of this paper is to review the state of price transparency efforts for health care services within the industry including the need for price transparency and the benefits and challenges currently facing price transparency measures. The paper also examines the current landscape of price transparency measures to understand the different solutions that exist to facilitate transparency, and compares the solutions in use among various hospitals within the Houston area for their effectiveness. Finally, a price transparency model will be proposed as a solution that can be standardized for use within the industry, with a discussion for applying this price transparency concept in a hospital setting and possible issues that could arise with the proposed implementation of the price transparency solution.

*Keywords*: health price transparency, comparative price information, consumer health care services, price transparency model, health care price information

**INTRODUCTION**

The topic of price transparency for consumer health care services has been garnering both national and media attention as of late. This interest in price transparency is particularly associated with the concerns over rising costs that have plagued the health care industry over the past several years. According to a report by Public Agenda, a non-profit public advocacy and research organization, 50% of Americans have inquired about their expected out-of-pocket costs before receiving the care they need, 63% believe that there is not enough information about how much medical services cost, and 80% agree that it is important for their state governments to provide comparative price information (Schleifer, Silliman, & Rinehart, 2017). A similar report by the Robert Wood Johnson Foundation (2016) stated that 69% of people surveyed want their insurance companies to disclose how much they pay physicians and hospitals for their services, and

82% of those who have compared health care prices in the past intend to compare prices for future medical procedures. Congress has recently shown bipartisan interest in finding a solution to this issue by reaching out to the American Medical Association and its executives for recommendations and feedback (Robeznieks, 2018). President Trump, in a recent re-election speech, promised to pursue an executive order that will compel insurers, doctors, hospitals, and other entities within the health care industry to disclose negotiated and discounted costs for health care services in an attempt to combat the health care price transparency issue (Armour, 2019). This promise came to fruition with the President's recently announced Executive Order that seeks to further improve price and quality transparency ("Trump Administration Announces Historic Price Transparency Requirements to Increase Competition and Lower Healthcare Costs for All Americans | HHS.gov," n.d.). Although specific guidelines regarding this order are still being established, there are clear indications that price transparency in regard to health care services is an issue that will continue to gain momentum. The objective of this paper is to discuss price transparency for health care services and to introduce a proposed implementation plan that will move toward price transparency implementation.

Despite the notion that a lack of transparency for health care services pricing exists, the reality is that price information does exist and can be obtained from most hospitals and insurers when needed; but, the process for obtaining this information can be tedious and vague and of little use to the end user. Most hospitals currently display a list of fees for services on their websites, as mandated by the Affordable Care Act (ACA), but, the information is not usually organized in a format that can help the average patient understand the expected costs for the services they need (Gustafsson & Bishop, 2019). Providing a standardized set of price information in a user-friendly format could help to ensure consistency and increase the likelihood that consumers will understand the information provided. This paper evaluates the current processes in place for price transparency measures in order to better understand the challenges impacting its effectiveness. Further, it explores potential options that can be beneficial to the process. Finally, the paper will present a price transparency model that can be implemented within any health care organization for the purpose of providing better functionality and usability to customers that seek related price information.

Compared to other industries, such as retail, where consumers have direct knowledge of price information for the goods and services they intend to procure, the health care industry is unique in that consumers are not immediately aware of the expected costs for the health care services they seek. This uniqueness is rooted in the fact that most health care services that patients receive are not typically provided as a single entity; instead, these services usually consist of a number of related services that often have separate charges from various providers attached. Sinaiko and Rosenthal (2011) explain that, it is difficult to capture the actual cost of care per patient because it is difficult to know in advance what exact services each patient will need.

For instance, a patient visit to a primary care physician for an annual checkup may include a physical examination as well as laboratory tests to monitor the cholesterol levels or check blood sugar levels. Depending on the patient's age, gender, or health status, additional procedures may be performed during the visit, and, the patient's laboratory results may require a pathologist consult, which incurs a separate charge. Patients with acute or chronic illnesses and those with more complex conditions will typically encounter multiple services over the course of their medical visit which may include hospitalization, inpatient or ambulatory surgery, and billed services from various other health care practitioners such as specialists, therapists, or counselors. In both scenarios, the cost estimates may be available to the patients before they proceed with the medical treatments but the actual costs for each particular case may be difficult to determine upfront due to the uncertainty inherent with each case.

Another factor that creates ambiguity in relation to expected costs for health care services is the disparity between a hospital's billed charges and the expenses that are actually covered by medical insurance plans. Fees submitted for hospital services are usually higher than the amounts insurance plans will eventually pay as a result of reduced prices negotiated for in-network coverages and other discounts (Gustafsson & Bishop, 2019). Since consumers are typically familiar with only the co-payments and deductibles for which they are responsible, it can be difficult to have a complete understanding of the full cost of these services—especially for serious illnesses and more complex conditions. This disparity can also affect consumers' abilities to compare prices with other hospitals given that insurance plans may negotiate different prices with other hospitals within the same area for the same procedure. These factors certainly highlight the

necessity to provide price transparency tools for consumers to support their decision-making processes.

## IMPORTANCE OF PRICE TRANSPARENCY

It is evident that making price information available for health care services gives consumers the ability to choose where and how they obtain the services they need. Providing patients with knowledge of their out-of-pocket costs before services are rendered assists them with deciding whether they want to receive the care as well as in preparing for the financial impact of the desired care (Mehrotra, Schleifer, Shefrin, & Ducas, 2018). This transparency can also help to reduce the perception of unexpected 'extra' bills that patients are sometimes faced with from out-of-network providers since the patients will be able to detect discrepancies with the amounts from the initial estimates versus what they are finally billed. It must be noted, as discussed further in the paper, that some progress has been made on this front by various state health agencies, commercial insurance plans, hospital systems, and private parties to provide cost estimates to patients prior to their receiving health care services. However, much work remains to be done to streamline this process using a set of standards that will make it easier for consumers to obtain price information when needed.


Maintaining a high level of quality care among providers is an additional significant aspect of price transparency. Although there is a tendency to assume that quality health care costs more, this assumption is not always the case. A study performed to examine consumers' choices of health care providers based on cost and quality indicators concluded that in the absence of descriptive quality data, participants tended to associate higher costs with better care; however, when descriptive quality data was presented along with cost information, a significant number of participants selected high-value providers that charged less for the same services (Hibbard, Greene, Sofaer, Firminger, & Hirsh, 2012). With the rise in high deductible medical plans as well as increasing premiums for plans offered by employers and insurance marketplace plans, it is especially important that emphasis be placed on the quality of health care provided in addition to the expected costs for those services so that consumers can make well-informed decisions with the most efficacious outcome for their cost outlays.

Adding to the other rationales for price transparency discussed above, the ability to induce competitive pricing for health care services may be the most significant reason for instituting price transparency standards. There

is evidence that suggests making price information available to consumers leads to an increase in selection of lower priced choices over other choices for the same services (Sinaiko, Joynt, Rosenthal, 2016; Whaley, et al., 2014). Similar studies that examined the outcomes of reference pricing for health services found that consumers were more likely to opt for those choices that used reference pricing models so as to reduce their out-of-pocket costs (Boynton, & Robinson, 2015; Robinson, Whaley, & Brown, 2016). By selecting health care services with lower associated costs as a result of price transparency, consumers can directly influence the trend of health care spending by inducing higher priced providers to adjust their prices in order to remain competitive in their local markets. Although one could argue that making such price information accessible to the public may actually inspire lower priced providers to scale up their prices (Sinaiko, & Rosenthal, 2011), the overall effect on prices will vary but it is more likely that a favorable downward shift of prices towards the median will occur, thus driving down health care costs.

**MOVEMENT TOWARDS PRICE TRANSPARENCY**

Recent progress in the movement towards price transparency has been made in part due to provisions within the Affordable Care Act legislation that stipulated that hospitals publicly disclose their prices (Furlow, 2019; "H.R.3590 - Patient Protection and Affordable Care Act", 2010). This stipulation by the Centers for Medicare and Medicaid Services (CMS), which became effective on January 1, 2019, requires hospitals to disclose their chargemaster prices in electronic format and to update this price information on an annual basis (Centers for Medicare and Medicaid Services, 2018; Furlow, 2019). Prior to this ACA/CMS directive, various measures were put in place to spur the move towards price transparency. For example, some states established cost estimator portals such as New Hampshire's HealthCost website where residents can obtain cost estimates for a variety of common medical procedures from different providers across the state (Kullgren, Duey, & Werner, 2013; Mehrotra, Brannen, & Sinaiko, 2014). Other states, including Texas, have websites managed by third party organizations (e.g. Texas Hospital Association) that display the average charge for selected procedures for a given hospital, comparing those charges across different hospitals within the local area and across the state ("Texas PricePoint", n.d.). Similarly, commercial insurance plans have taken the initiative to implement cost estimator tools on their websites. Aetna and United Healthcare each provide patients with customizable cost estimates based on location to assist with medical treatment decisions (Higgins, Brainard, & Veselovskiy, 2016). Various hospital systems across

the nation have also introduced online tools to generate cost estimates that patients can review prior to obtaining medical care (Meyer, 2018). In addition, private organizations like Castlight Health and Clear Health Costs are making strides in this area by promoting the discussion on price transparency and creating tools to encourage consumers to compare prices and obtain cost estimates and for employers and providers to leverage these tools for data analysis.

Most of the information presented with these online cost estimator tools offered by hospitals, insurance plans, and private organizations are facilitated through data harvested from all-payer claims databases (APCD). APCDs are large-scale, state-sponsored data repositories that collect claims information for medical, pharmacy, and dental services from private and public payers within the state (Porter, Love, Peters, Sachs, & Costello, 2014). Other relevant data, including patient demographics, provider details, facility type, diagnostic procedure codes, health plan payments, and member payments are also aggregated within the databases (Porter et al., 2014). APCDs as a concept were initially designed to support health care and payment reform initiatives in order to understand the cost, quality, and overall utilization of health care services (Porter et al., 2014); however, its utility in supporting price transparency measures has become quite necessary as various states ramp up efforts to establish and improve their price transparency solutions.

In response to the mandates set forth by CMS, most hospital systems have proceeded to incorporate hospital chargemaster lists on their websites for public access. The hospital charge description master, or chargemaster, is a list of all billable services, procedures, and products that represents the totality of services and consumables used in rendering patient care within the hospital (LaPointe, 2018; Tompkins, Altman, & Eilat, 2006). This list displays the costs for each procedure, service, supply, prescription drug, and diagnostic test provided by the hospital along with their current procedural terminology (CPT) codes and any fees associated with certain services such as equipment fees and room charges (LaPointe, 2018). Depending on the range of services provided by a hospital, the number of entries listed on its chargemaster can range from a few thousand to hundreds of thousands. The prices reflected on chargemaster lists are usually undiscounted prices that are generally higher than the prices accepted by insurance plans for payment which makes it somewhat unreliable for patients in estimating their costs for medical procedures.

## REVIEW OF PRICE TRANSPARENCY OF HOUSTON AREA HOSPITALS

To better understand the issue and how hospitals are working to implement price transparency regulations, nine hospitals with a presence within the Texas Medical Center were selected for review. The corporate websites for these hospitals were analyzed to determine what strategies these hospitals currently employ to propagate price transparency for their customers. The hospitals - Houston Methodist, Kindred, Memorial Hermann, St. Luke's, Texas Children's Hospital, MD Anderson Cancer Center, Harris Health, Houston VA, and HCA Houston Medical Center - have a diverse representation of services offered to the community, and eight of the nine hospitals have additional locations in various suburbs surrounding the Houston area.

With exception to the Houston VA, all of the hospitals reviewed were compliant with CMS guidelines regarding the display of hospital chargemasters on their websites, as depicted in Table 1. The chargemaster data were available as downloadable Excel files which made it easier to scroll through the individual line items. Unlike Texas Children's Hospital which required users to complete an online form before accessing the chargemaster, the chargemaster information for the other hospitals was readily accessible with minimal website browsing. Some hospitals provided additional information in the form of bundled payment estimates based on diagnostic related group (DRG) designations for common medical procedures (Table 1). The bundled payment estimates provided typically are the average total charges for all procedures required to treat a patient's condition, with or without any major complications. Memorial Hermann also included the average cost responsibilities for insured patients along with the bundled payment estimates which seems helpful in narrowing down actual out-of-pocket costs. The three hospitals that offered online 'cost estimate tools' actually provided bundled payment estimates that accounted for insured/uninsured status (Memorial Hermann and Texas Children's Hospital), and inpatient/outpatient status (Memorial Hermann and St. Luke's).

| | Chargemaster (Y/N) | DRG/Bundled Payment (Y/N) | Additional Details |
|---|---|---|---|
| Houston Methodist | Y | Y | Detailed explanation of the factors that determine billed charges is listed on the website. |
| Kindred | Y | N | Brief explanation of the factors that determine billed charges is listed on the website. |
| Memorial Hermann | Y | Y | Price estimate tool that generates bundled payment estimate is available (differentiates between inpatient/outpatient and insured/uninsured status). Website provides detailed explanation of the factors used to determine billed charges. |
| St. Luke's | Y | Y | Third-party estimator tool (TransUnion) that generates bundled payment is available, with explanation of the factors used to determine billed charges. |
| Texas Children's Hospital | Y (requires online signup to access) | N | Third-party estimator tool (PMMC) is available (requires patients to sign up with name, DOB, email address, and phone number before accessing the webpage). Website provides brief explanation of the factors used to determine billed charges. |
| MD Anderson | Y | N | Brief explanation of the factors that determine billed charges is listed on the website. |
| Harris Health | Y | Y | Detailed explanation of the factors that determine billed charges is listed on the website. |
| Houston VA | N | N | None. |
| HCA Houston Medical Center | Y | Y | Instructions to call for cost estimate is available for insured; no estimates available for uninsured. Brief explanation of the factors that determine billed charges is listed on the website. |

Table 1. Price transparency measures used in Houston area hospitals.

## EFFECTIVENESS OF CURRENT PRICE TRANSPARENCY MEASURES

The various solutions that presently facilitate price transparency in the health care industry should be applauded as noteworthy steps in the right direction. With the recent provision of chargemaster lists and online cost estimator tools, it appears that consumers, at the very least, are able to obtain some rudimentary information that can serve as a starting point for estimating what their health care needs will cost. The literature review uncovered a common theme regarding the issue of price transparency—the availability of price information when needed is not a major issue, but, the problem with transparency lies in the process for obtaining the price information and its usefulness after the information has been obtained (Frakt & Mehrotra, 2019; Furlow, 2019; Mehrotra, Schleifer, Shefrin, & Ducas, 2018). In other words, the effectiveness of these tools should be improved to enhance the overall customer experience.

The chargemaster provides the unit cost for the individual components that comprise the total package of diagnostic tests, medical procedures, supplies, medication, and services necessary to treat a given condition; however, consumers are not properly equipped to determine the various components and quantities needed for treatment. Also, entries on the chargemaster list in most cases are described using technical jargon and sometimes can be abbreviated, such that the average layperson may not understand or be able to figure out their use. Cost estimator tools are useful but the information generated in the form of bundled payments may not be reliable since those estimates are generally based on average payments made by insurance plans for similar conditions which may encompass a wide range of payments. There is usually no way to account for a patient's unique situation with bundled payment estimates, especially for patients with severe and complex medical conditions. While APCDs are not accessible to the public, their effectiveness for hospitals and third-party organizations can be improved by incorporating quality outcomes data along with the claims information.

## IDENTIFICATION AND DISCUSSION SOLUTIONS FOR IMPROVEMENT

A lack of standardization governing the processes and platforms used to generate price information, as well as the information itself, seems to be the biggest problem facing price transparency measures in the health care industry. The concept and tools are already in place but what is needed is a method to standardize the information that is produced so that consumers can compare prices across providers in order to make the best

decisions for their individual needs which is the overarching goal of price transparency. To help further this effort, state governments should enact laws that encourage better sharing of information and eliminate gag clauses that prevent payers from disclosing their negotiated prices to contracted providers (Mitts, 2014). The availability of these negotiated prices will allow consumers to select the most appropriate providers that meet their health care needs while maintaining their financial goals. Also, information about provider quality outcomes should be integrated with the price information that is available to patients to ensure that they are getting the most effective and affordable health care (De Brantes, Delbanco, Butto, Patino-Mazmanian, & Tessitore, 2017; Gustafsson & Bishop, 2019). Quality indicators such as prevention, inpatient and pediatric quality, and safety quality indicators (Agency for Healthcare Research and Quality [AHRQ], 2019) can differentiate effective providers with reasonable prices that represent the best options for health care needs. This will eliminate the tendency to opt for higher priced providers in the absence of quality information.

A combination of chargemaster prices and bundled price information should be made available by providers and hospitals on their websites. Bundled prices are more relevant for price comparison across different providers as compared to isolated chargemasters that are largely ineffective for comparison purposes. Implementing a standard protocol for displaying items on the chargemaster will be recommended to ensure uniformity and comparability. In addition to the undiscounted chargemaster prices, there should be a requirement that discounted prices and patient-responsibility amounts be displayed as well. The same approach should be applied to bundled price estimates. Patients should have a clear understanding of their overall financial responsibility for a given procedure or service. Similarly, it would be beneficial to show all payers, including Medicare and Medicaid, as selectable options in cost estimator tools to further refine the bundled payment estimates generated since this information is already being captured within the claims data stored in APCDs. Furthermore, it is imperative that physicians and other clinicians are knowledgeable about prices and can present cost estimates to patients during doctor visits and consults. Doing so will make health care providers more cost-conscious and likely to select the most appropriate strategies to manage their patients' conditions.

Taking all these factors into consideration, the model solution that exemplifies the key aspects required for price transparency in the health care industry will consist of the following features:

> *1)* Provide chargemaster lists that display both discounted prices and out-of-pocket estimates for insured and uninsured patients;
>
> *2)* Provide online tools that generate bundled payment estimates and account for insurance status including the option to select specific insurance plans;
>
> *3)* Present quality-related data alongside price estimates generated for each provider to ensure that patients can select the best value for their health care needs; and
>
> *4)* Educate physicians and other health professionals to be informed and have access to price information for the services they provide to promote full transparency among providers and patients.

Although there is evidence that consumers are not taking full advantage of price estimator tools when available to compare prices (Mehrotra, Dean, Sinaiko, & Sood, 2017), there is a high probability that more consumers will likely utilize these tools to seek price information when the process is standardized and functional. It is also likely that if health care providers shared price information in advance and as a part of the discussion of treatment options, patients may be more inclined to request information about their health care costs and compare prices among various providers, which could lead to lower out-of-pocket costs.

## PROPOSED IMPLEMENTATION PLAN

Implementing the proposed price transparency solution at any hospital should begin with preliminary discussions between the project manager and the primary stakeholders that will be directly impacted by this implementation project. The major stakeholders that will be impacted by such a project include medical staff representatives, the CFO or similar patient financial services leaders, department leaders from patient service areas (such as emergency department, patient admissions, inpatient and outpatient nursing, etc.), clinical care coordinators, and IT personnel, including those most familiar with the electronic health record system. Initial discussions should provide the opportunity for the project manager to *a)* meet with various project members to discuss expectations, concerns, and resources needed; *b)* determine key personnel in other departments that may augment the project with their input and/or assistance; and *c)* ascertain a feasible project timeline necessary to meet specific target goals.

It is also important for the project manager to plan out the expected timeline as precisely as possible within a reasonable timeframe. The average duration to complete a project of this scope will be 4-6 months. This interval should provide enough slack to account for unanticipated issues or setbacks. With the project execution plan and timeline already mapped out, the next step will be to seek approval from the hospital's leadership team. It is crucial to communicate the project's execution plan and expected costs to the leadership team and get their consent and commitment from the beginning because their support is essential for the project's overall success.

A thorough review of the hospital's chargemaster is necessary to ensure its accuracy and completeness. This review should verify that every item listed on the chargemaster has the standardized item description, CPT code, discounted price, and expected out-of-pocket cost for insured patients. The same approach should be used to review the individual components that make up the various medical procedure packages that are combined into bundled payments. The billing and coding department, medical staff representatives, and department leaders from patient service areas should be involved with this review process. At the same time there should be ongoing discussions with the IT department to determine the best tools and layout necessary for displaying the chargemaster and bundled payment estimates on the hospital's website in accordance with existing regulatory compliance guidelines. Similar discussions among the medical staff, clinical coordinators, IT, and other relevant personnel should be ongoing to decide the applicable patient quality outcomes information that must be incorporated with the cost estimates that patients receive. Designs for training materials and other resources that will be needed to educate the hospital staff about the implemented transparency tools should be discussed and approved. These activities are typically coordinated by the project manager during the formal project meetings. The project manager is also responsible for providing feedback and updates to the members regarding the project's status.

During the testing phase of the implementation, IT personnel will be required to perform a series of internal validations to verify that the newly designed chargemaster and bundled payment tools are properly configured on the hospital's website. When the transparency tools have been functionally tested and validated, it is recommended that a limited focus group of patients, caregivers and non-patients be formed to serve as external validation for the system. This step creates an opportunity for the eventual

end-users to interact with the system and give feedback on their experiences, both good and bad. Depending on the feedback received, changes and adjustments may be necessary to improve the system's functionality. A second focus group with a larger sample size should be formed to carry out further testing of the system, making sure to construct a group with broad demographical variation. Additional focus group testing may be performed as needed to tweak the system based on feedback received.

At the completion of the testing phase, the final product must be approved by the hospital's leadership team before it is put into production. The project manager should organize meeting sessions to report the project's results to the leadership team for endorsement. Meanwhile, the hospital can create awareness for the implemented tools by distributing promotional materials through different channels and arranging training events to educate its staff on the features. The project manager should then make necessary preparations to launch the new transparency tools by coordinating the resources needed for the launch event. During the post-launch interval, there should be processes in place to monitor the website's usage and collect feedback data from end-users. This information should be reviewed and addressed accordingly for quality control purposes. Furthermore, there should be similar review processes developed to verify that all applicable health professionals are knowledgeable of the costs for services they provide, with training provided as needed.

## CONCLUSION

Transparency in economic transactions is a necessity; pricing for health care services is no different. Consumers of goods and services in other industries, including dental and eye care procedures, are able to obtain actual prices and good faith estimates before the transaction is completed; it is confounding that the same is not true for a majority of health care services for which the same level of price transparency is largely non-existent. The advantages of promoting price transparency within the industry are notable, especially the potential to stem rising health care costs which is a major concern. The current efforts employed to create transparency, including hospital chargemasters and online cost estimators, are promising; however, much more needs to be done to increase the awareness, understanding, and effectiveness of these tools. Adopting a system to standardize the outputs that consumers receive when searching for cost estimates is required to encourage more activity while enhancing

its coordination with integrated quality metrics. Implementing price transparency in any hospital is a strategy that will heighten the overall patient experience while keeping the medical staff and personnel informed on market price trends. It is imperative that hospitals employ strategic planning initiatives to develop and implement price transparency tools in order to ensure that they are beneficial for patients. As the industry continues to promote further transparency, hospitals and other healthcare providers will need to maintain awareness and flexibility in adhering to these evolving initiatives.

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# OBSERVATIONS REGARDING YIELD CURVE INVERSIONS

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## *ABSTRACT*

It is widely understood that an inversion of the yield curve of a government's debt securities is a precursor to a domestic recession. The inversion-recession link has been reinforced by the popular press as a forgone conclusion to such an extent that the public does not question the nuances involved with an inversion of yields. Additionally, many academic and practitioner studies use a variety of different measures of inversion. This paper is an attempt to focus attention on the meaning of yield curve inversion as well as the frequency with which it occurs within U.S. Treasury securities. Specifically, it is shown that different maturity yields invert more frequently than is perhaps realized. Further, these maturity inversions are apparently not notable events given the silence of the press when they occur. One is left to question which definition of an inverted yield curve is most relevant given the context in which it will be used.

Keywords:      U.S. Treasury yield curve, inversion, recession, yield

## INTRODUCTION

On December 4th of 2018 the popular press trumpeted the news that the U.S. Treasury yield curve inverted for the first time in nearly a decade the previous day. This news was carried far and wide and its meaning speculated upon for several days. On the day of the inversion, the U.S. stock market as measured by the S&P 500 lost 3.2 percent of its value. The news of the inversion, broadcast in real-time over various media during the day, caused many to exit U.S. equity markets. Over the following 20 days the same index lost a total of 15.7 percent of its value.

It is apparent that the investing public, as well as other interested observers both human and electronic, have been conditioned to associate yield inversions with disruptive economic events without considering what precise maturities are inverted and the degree of the inversion. In fact, the

inversion on December 3rd of 2018 was one basis point between the 3- and 5- year Treasury notes, which meets the technical definition of inversion. However, such a dramatic response by investors following this miniscule inversion may be unwarranted.

It is not the intent of this paper to determine the most appropriate, most crucial, or most useful measure of an inversion of yields. Nor is it to explain why yields invert and any eventual effect that an inversion will have on an economy. The paper seeks to present some facts, using available data, that many academics had perhaps not considered when using yield curve inversion measures in their research and analysis.

Frequently, the press are the conduits through which academic and scientific research is made accessible to the general public. For example, headline stories published around the same time as an inversion in April 2019 included the measles outbreak of winter/spring 2019 and the first photographic evidence of the existence of black holes in space. These topics, and many others, have highly technical and justifiable foundations based in their respective academic, medical, and scientific fields. The popular press uses these foundations, theories, and studies as bases for the information they disseminate.

Much of academic research involves attempting to provide evidence either in favor or not in favor of particular theories. When the results of this research affect the public at large, the popular press distills the methodology and the scientific and academic jargon so that it is accessible to a layperson. In some research, different methodologies and different sets of data and parameters may lead to the same or different conclusions about a particular theory. When presented to the general public, the masses may be left with confusion over which study or conclusion is more accurate or believable.

Several studies have been conducted on the information content of an inverted U.S. Treasury yield curve. The focus of these studies include, but are not limited to:
   a. An inverted yield curve leads to subsequent recessions
   b. The depth of the recession that follows a yield curve inversion is related to the level or depth of inversion,
   c. What information the yield curve (and an inversion) may contain regarding central bank policies,
   d. How yield curves and volatility in the equity markets may be related.

e. If the Federals Reserve's use of large-scale asset purchases may have contributed to the probability of yield curve inversion.

Perusing the inversion studies available, it becomes apparent that there is not one standard definition of yield curve inversion. Of the literature reviewed, Table 1 indicates the inverted portion of the curve that was used in the authors' studies or article.

**Table I**
**Measure of Inversion used by various authors**

| 3-month 10-year | 1-year 10-year | 2-year 10-year | 1-year 5-year | 2-year 5-year | 3-year 5-year |
|---|---|---|---|---|---|
| Amadeo (2019) Barth,et.al. (2007) Cohan (2018) Haltom (2018) Leong (2019) Liu (2016) Johansson (2018) Miller (2019) Rudebusch (2009) | Bauer (2018) Koenig (2019) | Amadeo (2019) Benzoni (2018) Cohan (2018) Harris (2018) Pan (2006) Zamsky (2000) | Ferguson (2006) | Burns (2018) | Amadeo (2018) Burns (2018) Cohan (2018) |

The six columns of Table I detail the six different measures of inversion that are used or mentioned as examples. Additionally, Pento (2017) and Berge and Jorda (2011) used Fed Funds vs the 10-year Treasury as a measure, and Zamsky (2000) also used the 10-year/30-year inversion in his study. Therefore, at least eight measures are used by a combination of academics, practitioners, and the press.

It is interesting to note that studies originating from the Federal Reserve and their regional banks through publications and speeches are not in agreement on a specific measure of inversion. Bauer (2018) of the San Francisco

Federal Reserve Bank (FRB) uses the 1-year/10-year as does Koenig (2019) of the Dallas FRB.  Benzoni (2018) of the Chicago FRB chooses the 2-year/10-year to make a point, and the 3-month/10-year is used by Haltom (2018) of the Richmond FRB as well as Johansson (2019) and Miller (2019) for the Board of Governors in Washington, D.C.  Finally, in a speech to the Howard University Economics Forum, Vice Chairman Roger W. Ferguson, Jr. used the 1-year/5-year notes as an example of U.S. Treasury Yield Curve inversion in 2006.  One is left to wonder why representatives of our central bank vary so widely in the choice of an inversion measure.

**OBSERVATION 1:**
**The popular press reinforces the inversion-recession link even if there is no evidence of the inverted yield leading to an economic slowdown**

An example of the mainstream news that the U.S. Treasury yield curve inverted was presented by both Amadeo (2018) and Tran (2018).  Amadeo's story is an apparent attempt to educate with the title "Inverted yield curve and why it predicts a recession."  A statement such as this may lead one to believe that a recession always follows an inversion. The title of Tran's story is more ominous:  "Inverted yield curve: How it predicts financial disaster."  Regardless of the motive for the media to broadcast these messages or the mode in which the public receives the news, it appears that all are to fear the word "inversion."

Amadeo's original article on December 4, 2018 highlighted the one basis point inversion between the 5-year and 3-year U.S. Treasury notes and provided the following graphic:

| Date | 3-Mo | 2-Yr | 3-Yr | 5-Yr | 10-Yr | 3-5 yr. Spread |
|---|---|---|---|---|---|---|
| Dec. 3, 2018 | 2.38 | 2.83 | **2.84** | **2.83** | 2.98 | -0.01 |

The author updated her original article on March 26, 2019 when the yield curve inverted again.  However, the inversion was between a different set of Treasury maturity yields:

*"On March 22, 2019, the Treasury yield curve inverted more. The yield on the 10-year note fell to 2.44. That's 0.02 points below the three-month bill. The following Monday, it inverted a little more."*

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| Date | 3-Mo | 2-Yr | 3-Yr | 5-Yr | 10-Yr | 10-Yr. to 3-Mo. Spread |
|---|---|---|---|---|---|---|
| March 22, 2019 | **2.46** | 2.31 | 2.24 | 2.24 | **2.44** | -0.02 |
| March 25, 2019 | **2.46** | 2.26 | 2.19 | 2.21 | **2.43** | -0.03 |

Amedeo is correct that there was an inversion between the 10-year and 3-month yields on these days, but the 3-yr/5-yr inversion from December no longer existed.   Rather, an inversion does exist for the 2-yr/5-yr maturities. It should be noted the inversions are a miniscule amount.

Further, the press routinely disregards rigorous academic studies that point to more appropriate measures of inversions that may reliably predict future economic slowdowns.

**OBSERVATION 2:**
**The yield curve inverts among various maturities more frequently than many realize**

Data in support of this observation is collected from the Federal Reserve Data Download Program and consists of daily yields on U.S. Treasury Securities.  Reported data are for active trading days, therefore no holidays or weekend data are included. The data begins on January 3, 1962 and ends June 30, 2019 resulting in a total possible 14,357 observations.

Initially, unadjusted market yields for the 1-yr, 3-yr, 5-yr, and 10-yr maturities are available from the series.  On July 1, 1969 the 7-yr maturity is added and on June 1, 1976 the 2-yr maturity is included.  The 30-year bond is added as of February 15, 1977.  The 3-month and 6-month short-term Treasury bill data joins the dataset series at the beginning of 1982.

Although one-month T-bill and 20-year T-bond yields are eventually reported beginning July 31, 2001 and October 1, 2003, respectively, the number of observations is small compared to the other time series of Treasury yields.  These two maturities are included only for summary statistics and are not used further in compilations.

Table II contains summary statistics of the available Treasury yield data by maturity.  The number of observations varies by maturity, and therefore not directly comparable in all other measures due to the differing data periods for which they are computed.

**Table II**
**Descriptive Statistics of U.S. Treasury Interest Rate Dataset**

| Maturity | Initial date of Availability | Number of observations | Minimum Yield | Maximum Yield | Mean Yield | Median Yield |
|---|---|---|---|---|---|---|
| 1-mo | 2001-07-31 | 4,480* | 0.00 | 5.27 | 1.27 | 0.85 |
| 3-mo | 1982-01-04 | 9,375 | 0.00 | 15.49 | 3.94 | 4.07 |
| 6-mo | 1982-01-04 | 9,375 | 0.02 | 15.67 | 4.12 | 4.30 |
| 1-yr | 1962-01-03 | 14,357 | 0.08 | 17.31 | 5.14 | 5.17 |
| 2-yr | 1976-06-01 | 10,766 | 0.16 | 16.95 | 5.33 | 5.30 |
| 3-yr | 1962-01-03 | 14,357 | 0.28 | 16.59 | 5.56 | 5.56 |
| 5-yr | 1962-01-03 | 14,357 | 0.56 | 16.27 | 5.83 | 5.73 |
| 7-yr | 1969-07-01 | 12,488 | 0.91 | 16.05 | 6.23 | 6.27 |
| 10-yr | 1962-01-03 | 14,357 | 1.37 | 15.84 | 6.17 | 5.92 |
| 20-yr | 1993-10-01 | 6,440* | 1.69 | 8.30 | 4.67 | 4.76 |
| 30-yr | 1977-02-15 | 9,594** | 2.11 | 15.21 | 6.80 | 6.61 |

Table II notes:
*Data availability restricted the time periods of the 1-month and 20-year maturities. Comparative statistics are not in line with other maturities as they do not include earlier, high-rate periods.  These maturities are excluded from further analysis
** The 30-year maturity was not offered by the US Treasury during some parts of the data period and are excluded from further analysis.

In order to determine when an inversion of yields exists, each low maturity Treasury yield is subtracted from each longer-maturity Treasury yield.  In other words, an observation is counted as inverted if the spread between two maturities is negative indicating that the shorter-maturity yield is above that of the longer-maturity yield on any particular day.

Because the data series of each security may contain different numbers of observations, the number of days that a negative spread occurs for each pair of maturities is divided by the number of potential observations available. Table III displays the percentage of available trading days in the data period that the spread was negative between two maturities.  For example, there are 14,357 and 10,766 daily observations available for the 3-year and 2-year securities, respectively.  During the data period, the yield on the 2-year security was below that of the 3-year security on 1,725 days out of a possible 10,766 daily observations both yields were available, resulting in a 16.0 percent inversion percentage between the two securities.

**Table III**
**Column-designated maturity yield less than the row-designated maturity yield**
**Percentage of observations available when inversion took place between two maturities**

| Maturity | 3-mo | 6-mo | 1-yr | 2-yr | 3-yr | 5-yr | 7-yr |
|---|---|---|---|---|---|---|---|
| 6-mo | 5.3 | | | | | | |
| 1-yr | 7.6 | 12.4 | | | | | |
| 2-yr | 8.1 | 10.7 | 14.4 | | | | |
| 3-yr | 7.7 | 10.0 | 16.5 | 16.0 | | | |
| 5-yr | 7.2 | 9.4 | 17.4 | 16.0 | 18.6 | | |
| 7-yr | 5.9 | 7.6 | 15.7 | 13.7 | 15.3 | 11.2 | |
| 10-yr | **5.6** | 7.7 | 17.7 | **14.0** | 18.1 | 17.6 | 20.8 |

The most popular measures of inversion, the 3-month/10-year and the 2-year/10-year, are highlighted in Table III. It should be apparent that there are maturity combinations which invert a greater percentage of the time than these most popular measures.

For example, the 3-month and 6-month security each have the same number of observations and the 6-month maturity inverts a higher percentage of the time across all longer-maturity securities. This observation begs the question why the 3-month/10-year pair used in so many studies is a better indicator of an inverted yield curve than the 6-month/10-year.

The same can be said of the popular 2-year/10-year as a focus of much academic research. Of the available data, the 1-year/10-year inverts a higher percent of the time against all longer-maturity securities than the 2-year does against longer-maturity securities.

**OBSERVATION 3:**
**Visual representation of standard measurements of inversion may lead one to believe the measures represent some standard policy**

It is common practice to represent yield curve inversions in graphical form as interest rate spreads between two maturities. The Federal Reserve Bank of St. Louis provides standard yield curve spread graphs available for download through its FRED Economic Research site. Interestingly, the time series of spreads automatically provided for public consumption are the 3-month/10-year and 2-year/10-year.

**Image 1**
**10-Year Treasury Constant Maturity Minus 2-Year Treasury Constant Maturity**
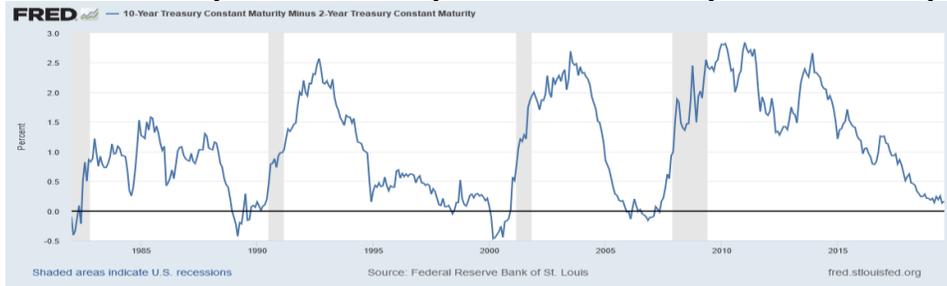


**Image II**
**10-Year Treasury Constant Maturity Minus 3-Month Treasury Constant Maturity**



Given the literature and statements from Federal Reserve researchers previously mentioned, there appears to be no universal standard of inversion adopted by the central bank itself. Therefore, it remains curious as to the choice to highlight the 3-month/10-year and 2-year/10-year on the FRED Economic Research site. In doing so, one conducting research in this area may tacitly assume that a policy exists within the Federal Reserve and that these two measures of inversion are the *de facto* standard. This assumption may explain why these two measures are so widely used as variables in inversion studies.

**OBSERVATION 4:**
**Prior to a recession, inversions are more prevalent for some maturities other than the most popular**

Historically, recessions have been known to occur between 6 – 24 months following an inversion of the yield curve. While the specific maturities that signal the start of a countdown to recession may be debatable, several studies using different inverted maturities provide evidence of the inversion-recession phenomenon.

In order to determine the frequency with which a particular portion of the yield curve inverts prior to a recession, yield spreads were collected for the 18-month period prior to the start of the last five "official" recessions in the U.S. Each short-maturity yield was subtracted from the long-maturity yield. A negative result indicates the two maturities are inverted. Table IV displays the average percentage of the 18-month time period that the yield spread was negative between selected maturities. The two most popular measures are in columns three and four. As one reads across each row representing a particular recession, it should be apparent that other yields invert a higher percentage of the time prior to a slowdown. Of note is that both the 6-month/10-year and the 1-year/10-year invert with consistently greater frequency than the more popular 3-month/10-year measure of inversion.

**Table IV**
**18-month period prior to the start of a recession in the U.S.**
**Percentage of days the pair of yields were inverted**

| Begin | End | 3 month 10 year | 2 year 10 year | | 6 month 10 year | 1 year 10 year | 1 year 5 year | 2 year 5 year | 3 year 5 year |
|---|---|---|---|---|---|---|---|---|---|
| 06/01/2006 | 11/30/2007 | 62 | 54 | | 73 | 70 | 77 | 68 | 63 |
| 09/01/1999 | 2/28/2001 | 36 | 61 | | 48 | 46 | 29 | 54 | 54 |
| 01/01/1989 | 6/30/1990 | 26.4 | 48 | | 32 | 39 | 42 | 58 | 73 |
| 08/01/1980 | 06/30/1981 | NA | 75 | | NA | 74 | 71 | 70 | 70 |
| 07/01/1978 | 12/31/1979 | NA | 91 | | NA | 91 | 91 | 93 | 84 |

**CONCLUDING REMARKS**

It is not the purpose of this research to determine why the U. S. Treasury yield curve inverts, nor to explain the significance of the inversion. It is recognized that a variety of factors may cause the U.S. Treasury yield curve to invert from time to time and more rigorous research is available on the subject. The effect a yield curve inversion has on a variety of economic and financial entities, markets, and economies is also well studied.

This paper is an attempt to provide some evidence that may be used by researchers to more carefully consider which measurement is most appropriate for their studies. Since there is not one universally accepted measure of yield inversion, prior research may result in different conclusions had another measure of this phenomenon been used in the

analyses.   Perhaps including more than one measure of yield curve inversion, either separately or combined, would lead to more robust conclusions in future research when a measure of yield curve inversion is deemed necessary.

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# AHP BASED FRAMEWORK IN DRIVING INTELLIGENCE FROM SOCIAL MEDIA TO IMPROVE ORGANIZATIONAL PERFORMANCE: AN EXPLORATORY STUDY

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*ABSTRACT:* Based on Zeng et al. (2010) social media analytics is defined as "using advanced informatics tools "and analytics techniques to collect, monitor, and analyze social media data to extract useful patterns and intelligence." The purpose of this study is to propose a framework based on the analytic hierarchy process (AHP) methodology, to investigate the influence of social media usage to improve supply chain performance. Social media has been recognized as, a powerful prestige in business practice, however, there is lack of understanding, how organization can leverage SMPs to drive intelligence/benefit from it. This study fills the gap on evaluating the influence of SMP's in gathering intelligence. Authors have considered 5 important factors for evaluation of performance of a supply chain. Our findings indicate that the top three supply chain performance indicators are, quality, assurance of supply and delivery. While the top the supply chain intelligence is, supplier intelligence, and supply chain visibility intelligence. And the top three SMP alternative policy options are, LinkedIn, Facebook and Twitter respectively. The findings suggest that higher usage of SMPs by organizations in driving intelligence and result in better supply chain performance.

Keywords:  Social Media, Supply Chain, Competitive Intelligence, AHP

## INTRODUCTION

Few studies have researched the impact of how social media platforms (SMPs) provides insights in deriving intelligence from organizational context (Leonardi and Vaast 2016; Orlikowski and Scott 2008).

Intelligence is a vital attribute for organization to leverage in handling, averting risk and making the desire course of action (Thackeray & et, al, 2008). However, there is an urgent need for organizations to monitor not only their own social media sites but also their arch rival social media sites. Leveraging of social media by organizations, the large amount of customer-generated information on social media sites has recently became a new avenue of gathering of intelligence (Xu XZ. Kaye GR, 1995). Sharing, relationship-building, and improving communication, coordination, and performance; SMPs provide organizations an opportunity to monitor and analyze consumer conversations and derive insights from that information to improve their performance (MacAfee and De Simone, (2012). From this perspective, SMPs can be useful for supply chain organizations, by serving as an important inbound marketing channel, by influencing potential future customers and by empowering past customers to share their experiences (Ang, 2011). As organizations continue make the best use of their business opportunities and comparative advantage to appropriate for them to be involved during dramatic event (Sun, 2011). Hence, it is necessary to decide the usefulness of supply chain intelligence (SCI) from SMPs for diverse supply chain performance determination. According to Lieb (2009)" social media is digital, content-based communication based on the interactions enabled by a plethora of web technologies". Further, Macafee and De Simone (2012) contend that social media can also be used for information-sharing, relationship-building, and improving communication, coordination, and performance. SMPs offer organizations an opportunity to monitor and analyze consumer conversations and derive insights from that information to improve their performance; by serving as an important inbound marketing channel, by influencing latent customers and by empowering past customers to share their experiences (Ang, 2011). According to (Dey et al, (2011) competitive intelligence (CI) can be explained as the fusing of any features of the environment necessary to aid senior management officials in making prudent decisions for organizations. Social media permit for a wide variety of pursuits including worldwide information access, discussion, groups and file transfer facilities, all of which impact business strategies (Kietzmann et al., 2011; Fill, 2009; Chaffrey et al., 2009; DiStaso et al., 2012; Vuori et al., 2011). The influence of social media like Twitter, Facebook, LinkedIn, Instagram and others is rapidly growing and cannot be ignored as a means of fostering and preserving connections. Despite the fact that, there are an increasing number of organizations developing an SMP presence, however, only a small number of academic studies have focused on social media as a means of driving intelligence tool. This study's contribution is significant because of

the lack of study on how intelligence gained from social media can impact organizational performance.

We realize that organizations are starting to comprehend the importance of SMPs for their organizations, however, they still continue to face some hurdles. As organizations continue to confront these challenges on how they should arrange and handle SMPs within their respective organization and what sweeping changes in organizational structure and processes are required for the execution of social media platforms (Aral et al. 2013).
In light of the above, the purpose of this study is to analyze the application of (AHP) approach to evaluate the main question of this study "How social media usage impact organizational performance in deriving intelligence ". The contribution of this research is significant because there exists the lack of study on how intelligence from SMPs links to supply chain performance.

This study aims to link the SCI from SMPs to supply chain performance. This study is one of the first studies conducted in the U.S., especially within the different organization by demonstrating the different areas of organizational performance that can be enhanced by using social media in various ways. With this end view, in this study we propose the analytical hierarchy process frame work to evaluate the influence of social media in driving intelligence to improve organizational performance. The rest of the paper is organized as follows. Section 2 we review relevant literature on the influence of social media on organizational performance. We then introduce the study area of supply chain organizations. Then draws concluding remarks.

**LITERATURE REVIEW**

In this section, we review the literature on competitive intelligence, social media in logistics and supply chain management, impact of in gaining supply chain competitive intelligence. Hence, the literature review provides the theoretical background for this study.

According to Zeng et al. (2010) social media analytics has been defined as "using advanced informatics tools and analytics techniques to collect, monitor, and analyze social media data to extract useful patterns and intelligence." Intelligence, involves three main activities mainly: the gathering, capturing data, their examination and explanation, and the spread of the acquired knowledge/skills (Teo & Choo, 2001). Miller (2001) proposed to describe competitive intelligence within a continuous cycle

through which raw data are collected, converted into actionable information that is then disseminated, evaluated and was able to be used by organization's decision makers. Social media permit organizations to link and use market information to be able to reach desired consumer gratification and good entrepreneurial performance; hence, social media constitutes a revolutionary device for organizations to gather data on customers and competitors' products alike (Rappaport, 2011). Based on He, Zha, & Li, 2013; Moe & Schweidel, (2014). social media intelligence was formulated several years ago with the intention of acquiring actionable information from SMPs, enabling decision making frameworks, and furnishing solutions for the present and new applications that could advantageous from the crowds obtained through the Web (Zeng, Chen, Lusch, & Li, 2010). Competitive intelligence offers a method for organizations to compare their performance against their peer organizations (Sanderson, 2013; Bose, 2008). As a result of the comparison, organizations can focus on their efforts on improving the areas that are still weak when compared to peers and also develop efforts that can have the greatest impact (RemitDATA, 2013). Competitive intelligence offers a number of benefits such as creating new growth opportunities, minimizing the impact of surprises, enabling faster responses to changes in the market place, improving the quality of strategic planning processes, identifying potential vulnerabilities, providing early warning or alert for competitive threats (Chen and Das, 2010; Bose, 2008; Ross et al., 2012). The use of social media by organization, furnishes countless advantages, and several of them have established   a positive link between social media and organizational performance (Ainin et al., 2015; Paniagua and Sapena, 2014; Parveen et al., 2013; Rodrigues/ organizational et al., 2015). Rodriguez et al. (2015) laid the foundation that social media use had a positive impact on customer-reputation and their activities and hence surge in sales performance. At the same time, Kwok and Yu (2013) asserted that, Facebook use had a positive impact on SMEs' sales performance. The adoption of social media has positive influence on organizational social capital that in turn impacts performance (Ferrer et al., 2013). In the same way, Hassan et al. (2015) made a remark, stating that social media may have important influence on organizations impact of purchasing abilities. Previous studies indicate that, that social media use had a positive influence on the financial as well as non-financial performance related issues (Praveen et al., 2013; Scupola and Nicolajsen, 2013; Thong, 2001). Organizations must act in an agile way to any changes and be responsible to have able individuals to handle with the related facing challenges on a regular basis. Reactions obtained from social media sites can be easily used to update organizational plans and make some

changes confessing the willing of constant support to customers (Dane, 2016; Olof Lagrosen and Grundén, 2014). Using social media to follow the behavior of their arch competitors and examining the outcome to use in business assist to update business followed by rising to higher standard course of action, presenting deductions as offering discounts and other proffers to entice additional    customers (Caruso, 2016). Consequently, executing social media within the marketing strategy, organizations can derive extra information regarding the market behavior, rivals, mainly their customers and other necessary requirements that enhances the information accessibility of the organizations ability to use the means to unexpected upheavals (Praveen et al., 2013). Finally, social media platforms enhance digital marketing strategy, communication, promotion, the management of customer service issues, mining innovative ideas, and building customer relations (Solis, 2010). Organizations that are currently utilizing using social media platforms are changing from the customarily way of conducting organization business approach to a present and advanced means (Praveen et al., 2016). Therefore, the study poses the following question: Using the application of (AHP), the main question of this study was "How social media usage impact organizational performance in deriving intelligence ". We contribute to the stream of research which leverages AHP's ability to deal with multi-attribute decision problems in supply chain management by being the first to use AHP to prioritize the influence of SMPs in driving intelligence to improve supply chain performance.

## METHODOLOGY, DATA COLLECTION, AND DATA ANALYSIS

The influence of social media platforms in driving intelligence is a common multi-criteria decision making problem that includes multiple criteria that can be both qualitative and quantitative in nature. A multi-criteria approach technique is proposed for this study. AHP is an approach which helps in decomposing, organizing and analyzing a complex problem (Saaty, 1980; Dey and Cheffi, 2013 Luthra et, al. 2013; Govindan, 2015a; Mangla etal. 2015). The AHP permits decision-makers to model a complex problem in a hierarchical structure, illustrating the associations of the primary goal, criteria (decision objectives), and alternative policy options. AHP is widely utilized in both practitioner and academic studies. Previous studies that have extensively used AHP that includes supply chain management (e.g., Gaudesi and Borghesi 2006), marketing (Dyer and Forman 1992), and pharmaceutical risk management (Enyinda et al. 2009).

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## AHP APPLICATION TO SOCIAL MEDIA PLATFORMS IN DERIVING INTELLIGENCE

A common AHP is composed of the following four-phases. 1) Construction of a hierarchy, which describes the problem. The primary and overall goal is at the top of the structure, with the main attributes on a level below. 2) Derive weights for the lowest-level attributes by conducting a series of pair-wise comparisons in which each attribute on each level is compared with its family members in relation to their significance to the parent. However, to compute the overall weights of the lowest level, matrix arithmetic is required. 3) The options available to a decision-maker are scored with respect to the lowest level attributes. Similarly, the pair-wise comparison approach is used. 4) Adjusting the options' scores to reflect the weights given to the attributes, and adding the adjusted scores to produce a final score for each optimum (Roper-Lowe and Sharp 1990). The hierarchy structure is consisting of the main decision criteria/sub-criteria and the SMPs alternatives policy options include Facebook, Twitter, LinkedIn, YouTube, and Instagram as shown in Figure 1.

AHP steps are as follows:
1. Define an unstructured problem and determine the overall goal. According to Simon (1960), the methodology of decision-making process encompasses identifying the problem, generating and evaluating alternative policy options, designing, and obtaining actionable intelligence. The primary goal of is depicted in the first level of the hierarchy, shown in Figure 1.
2. Build the hierarchy from the top through the remaining phases (main decision criteria on which the rest phases rely on) to the lowest level, which that usually contains the list of alternative policy.
3. Construct a set of pair-wise comparison matrices for each of the lower levels. The pair-wise comparison is made such that the attribute in row $i$ ($i = 1, 2, 3, 4...n$) is ranked relative to each of the criteria's represented by $n$ columns. The pair-wise comparisons are made in terms of which element dominates another (i.e. based on the relative importance of each elements). These judgments are then expressed as integer values 1 to 9 in which 1) $a_{ij} = 1$ means that $i$ and $j$ are equally important. 2) $a_{ij} = 3$ signifies that $i$ is moderately more important than $j$. 3) $a_{ij} = 5$ suggests that $i$ is strongly more important than $j$. 4) $a_{ij} = 7$ indicates that $i$ is very strongly more important than $j$. Finally, 5) $a_{ij} = 9$ signifies that $i$ is extremely more important than $j$ (see Appendix A).

The following steps describe how AHP is constructed for assessing supply chain performance:

1. Formulation of the aim of this study: Evaluating the decision criteria in order to identify their relative importance in the supply chain performance strategy initiatives in supply chains, is defined as the aim of this study.

2. Develop the pair wise comparisons: Pair wise comparison is conducted by means of data collection from supply chain professionals based on expert judgment, the pair wise comparisons among the factors are achieved through Saaty (1980) a nine-point scale as shown in Table 2.

3. Computation of the Eigenvalues and Eigen vectors (PV) referred as geometric mean (GM) and relative importance weights: The pair wise comparisons matrices were used to decide the Eigen values and Eigen vectors that are further analyzed to compute the relative importance weights of the key decision factors.

4. Evaluation of the consistency ratio: The consistency ratio (CR) is computed to assure the consistency of pair wise comparisons. The mathematical expression used for finding the CR is provided as, CR ¼ CI/RI, where the consistency index is signified by (CI) ¼ (Mix - n)/ (n - 1) (mix is the maximum average value) and the value of the random consistency index (RI) depends upon value of (n). As recommended by Madaan and Mangla, (2015), the value of CR should be less than 0.10 (10%) to have better level of consistency. The aim of this stage is to identify supply chain performance strategic selection of SMPs criteria. Based on the importance, weight and preference of the SMPs technologies different decision criteria are allocated. To select an auspicious and relevant SMPs technology AHP has been used "figure 1". The first step in this process is to construct a graphical representation /or sketch of this problem in which the primary goal (level i), key decision criteria factors (Level ii), sub-criteria (Level iii) and policy alternative options (iv) are having been illustrated (Ford, D. and Sarren, M. (1996). Following the determination, the partial weight of the decision criteria, the weight of each SMPs are identified and the auspicious technology is selected. The outcome of this stage is a list of priorities about SMPs technologies. At end of this study a numerical example for SMPs selection is presented as follows. An organization intends to select SMPs using AHP. To this end, first the AHP model should be composed, and then option importance matrix is formed according to table 1.

The process of data collection, a decision group of five supply chain professional experts is formed consisting one chief executive officer, three executive sales manager, and one supply chain professional of an organization. After finalizing the supply chain professional expert panel, the next task was to gather the data. Finally, the expert panel responses were collected and data was gathered. Finalization of the important key decision criteria of supply chain performance strategy. There were 5 key decision factors of supply chain performance strategy identified and collected through the literature. The responses were gathered and arranged with the supply chain experts to finalize the reported criteria for supply chains performance strategies in the context of the supply chain organizations. The experts show agreement with all identified supply chain performance strategies, hence, a total of 5 main criteria were selected. The finalized supply chain performance strategic criteria were evaluated using AHP, whose relative importance was invaluable identified through supply chain expert input. A hierarchical structure is formed using supply chain expert inputs (Fig. 1). This hierarchical structure has three different levels: Evaluating the supply chain performance strategic criteria for relative importance (phase-1), the five categories of criteria's (phase-2) and six specific sub-criteria referred to organizational intelligence (phase-3), and five policy alternative options by which the SMPs are evaluated are place at the bottom (phase - 4) of the hierarchy. Pairwise comparisons are derived for both categories of criteria and the specific sub-criteria using supply expert's inputs by a means of a Saaty scale (See Appendix). This way a pairwise comparison matrix for categories of criteria was framed and their relative weights are summed up in Table 1. The pairwise comparisons for specific criteria (organizational intelligence) under each category and their corresponding relative weights are indicated in Tables 1. The pairwise comparison matrices were used to decide the relative importance and weights were assigned corresponding to each category of criteria's as given in Table 1.

*Table 1. Normalized Pair-wise Comparison Matrix of the main criteria with respect to the Goal*

| Criteria→↓ | Delivery | Quality | Assurance of supply | Flexibility | Cost | Weight | Rank |
|---|---|---|---|---|---|---|---|
| Delivery | 1 | 5/8 | 5/6 | 1 | 8/5 | 0.190 | 3 |
| Quality | 8/5 | 1 | 7/5 | 7/5 | 7/5 | 0.256 | 1 |
| Assurance of supply | 6/5 | 5/6 | 1 | 7/5 | 6/5 | 0.230 | 2 |
| Flexibility | 1 | 5/7 | 5/7 | 1 | 1 | 0.171 | 4 |
| Cost | 5/8 | 5/7 | 5/8 | 1 | 1 | 0.125 | 5 |

This study uses questionnaire survey to obtain supply chain professionals opinion on using SMPs to derive intelligence to improve organizational performance. Data was collected between June 21, 2018 – September 10, 2018. The survey was conducted through Qualtrics and was sent out to 20 supply chain professional to provide their expert judgement. The experts provided response to several pair-wise comparisons, where two categories were compared with respect to the primary goal (See Appendix A). All, the 20 gave a measure of the relative importance of each decision criteria. Hence responses obtained from SCP were used as input for AHP into Excel and then read into SAS where calculations for obtaining priorities were performed. It took a total of 10 judgement (5(-1)/2) to complete the pair-wise comparisons shown in table 1. To derive the estimates of the main decision criteria priorities, we used the obtained data that is reported in the matrix. The priorities gave a measure of the relative importance of each decision criterion. Table 1 provides the relative importance of the supply chain performance by criteria type. From the analyzed results shown in the above table, larger values of the eigenvector indicate greater importance of the supply chain performance with respect to the criteria. Thus five best addresses the supply chain performance criterion, followed on a descending order DL, QL, AS, FL, and CT. Result indicates that, quality criteria was the most important dimension of supply chain performance followed by assurance of supply, delivery, flexibility and cost.

## RESULTS AND DISCUSSION

Table 1 presents reports on the priority scores associated with main supply chain competitive intelligence decision criteria (II) and the priority matrix of social media platform alternative policy options (IV). For the decision criteria, quality (0.256) is the most important supply chain competitive intelligence, followed by assurance of supply (0.230), and quality (0.190), respectively. However, alternative policy options, the overall priority scores, LinkedIn (0.322) is the most preferred social media platform option,

followed by Facebook (0.206), Twitter (0.176) respectively. That is LinkedIn > Facebook > Twitter. Therefore, LinkedIn is the overall best social media platform option.

**Table 2. Priority Matrix of Social Media Platforms Alternative Policy Options**

|  | 3 | 1 | 2 | 4 | 5 |  |  |
|---|---|---|---|---|---|---|---|
|  | DI | QL | AS | FL | CT |  |  |
| Priority | **0.190** | **0.256** | **0.230** | **0.171** | **0.125** | **OP** | Rank |
| LinkedIn | 0.061 | 0.083 | 0.074 | 0.055 | 0.049 | **.322** | 1 |
| Facebook | 0.039 | 0.053 | 0.047 | 0.035 | 0.032 | **.206** | 2 |
| Twitter | 0.034 | 0.045 | 0.040 | 0.030 | 0.027 | **.176** | 3 |
| YouTube | 0.033 | 0.044 | 0.039 | 0.029 | 0.026 | **.171** | 4 |
| Instagram | 0.024 | 0.032 | 0.029 | 0.022 | 0.019 | **.125** | 5 |

From the analyzed data it can be concluded that, with respect to the overall priority scores, LinkedIn (0.322) is the most preferred social media platform option, followed by Facebook (0.206), Twitter (0.176), YouTube (0.171), and Instagram (0.125), respectively. That is, LinkedIn > Facebook > Twitter > YouTube > Instagram respectively. Therefore, LinkedIn is the overall best social media platform choice option.
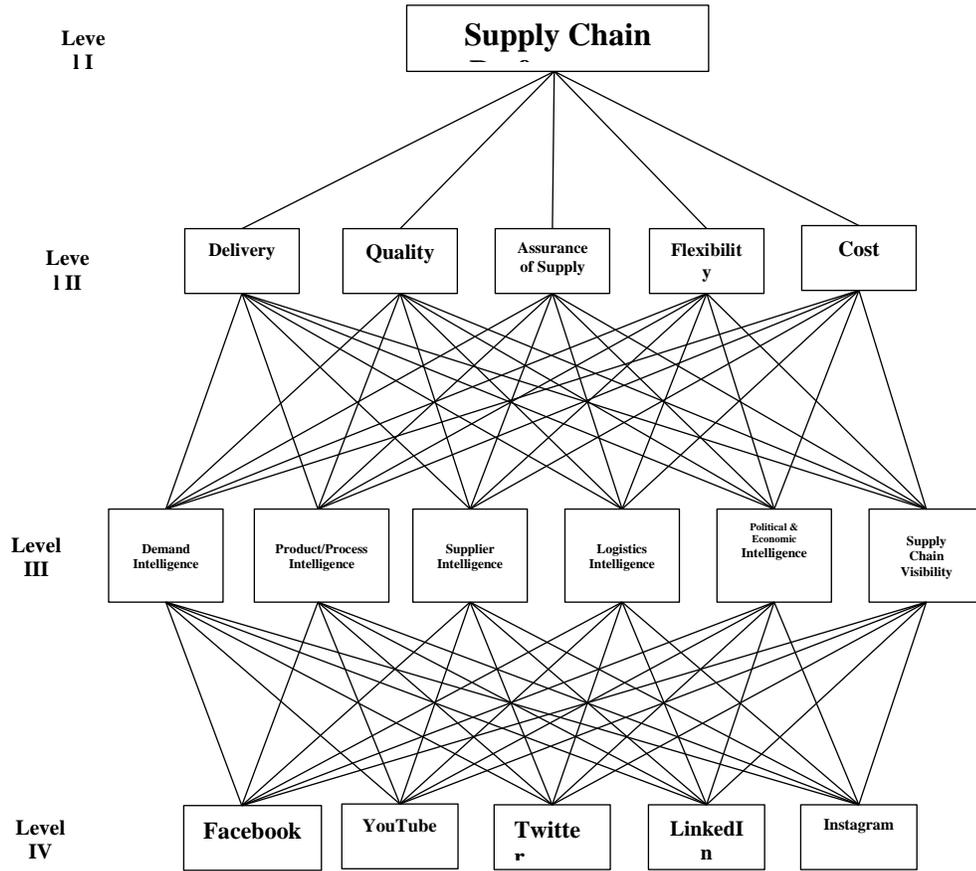
**Figure 1: AHP based Hierarchical Model to Evaluate Supply Chain Performance Strategic Criteria**

The supply chain management is a concern for all organizations nowadays. The result of using a particular SMPs to acquire supply chain intelligence should give a prime incentive to upper level executives and managers to review the current position of the organization to be able to improve the performance particularly to increase revenue, profitability and maintain their reputation in the global market. One way for the supply chain to sustain its performance, varies from organization to organization; leveraging the SMPs, only vary in their ranking of relative importance, the way to measure them can be standardized. The proposed, framework is assessed on the basis of questionnaire collected for each level of the organizations from Midwestern part of the United States. As it can be seen (Table 1) the mean rating (both level) is utilized, as an input data to compute the pairwise comparisons of criteria but the framework is also applicable to the various types of organization by permitting executives and managers and to

structure their problems into priority weights, and review their own priority reflection. In this study the adoption of SMPs between the various forms and their link is identified and LinkedIn appears to be the preferred option followed by LinkedIn, Facebook and Twitter, however, YouTube and Instagram appears to occupy the lowest score, among the various SMPs. This framework is claimed to be applicable to the various types organizations located throughout the Midwestern part of the United States, as the work is based on the responses collected from the supply chain professionals from those organizations. However, a new procedure may be adopted to a particular type of organization so as to get more additional precise framework. The obtained framework is expected to assist executives and managers to assess the present state of the organization to take remedial measures. The study may further be extended to determine curative strategy to improve upon lowest scores among the SMPs which eventually should lead to improving the overall spectrum of supply chain performance.

**MANAGERIAL IMPLICATIONS**

Based on Table 1, the order of relative importance of categories of decision criteria's is given as:  DL, QL, AS, FL and CT. The order of relative importance of specific sub-criteria are also given in Table 8. A total of five criteria's are divided into six sub-criteria's of assessment, and keeping that in mind, this study has put forward several implications for supply chain executives and managers. To begin with, the category 'supply chain performance holds the first position in the hierarchy, and consequently, occupies the highest relative importance in comparison to other categories in supply chain performance strategies in a supply chain. This means that achieving SCP strategies in a supply chain is not possible without the supply chain performance strategies support and related sub-criteria's. The impact of SMPs is crucial in enforcing the organizations to implement and promote SCP to be able to increase the level of efficiency of different types of business activities to mitigate the use of inputs and thereby avoiding waste (Adham et al., 2015).

**CONCLUSION, LIMITATION AND SUGGESTIONS FOR FUTURE WORK**
Supply chain performance strategies (SCPS) , consumption and production is   an   important exercise that requires implementation at a global level rather than just a national level, it essential to formulate anticipatory supply chain performance strategies associated with products, processes and services to improve efficiency, reduce the negative impact on the supply

chain performance and hence secure proper customer satisfaction, increase revenue, profitability and increase market reputation (Luthra, S., Mangla, S. K., Xu, L., & Diabat, A. (2016). this study proposes a structural model for evaluating the decision criteria associated with the supply chain performance strategies in a supply chain. the five categories of criteria's and six specific sub-criteria related to the supply chain performance strategies were identified from the literature and from experts' inputs. then, and analytical process hierarchy (AHP) analysis is used to evaluate these key decision criteria in order to determine their relative importance of sequence. the importance sequence of groups of categories of criteria for supply chain performance strategies is given as DL, QL, AS, FL and CT. This study also presents a case example to illustrate the organizations real life applicability of the proposed network model. the findings of this study can be particularly useful for the case of organizations aiming to become more capable in analyzing the SCPS implementation related criteria. This study may also assist executive and sales managers, policy makers and SC practitioners/managers to prioritize their decision criteria to promote SCPS from the supply chain perspective. This study has certain limitations. The AHP based structural model that is proposed in this study consists of five main criteria and six specific sub-criteria to the implementation of SCPS in the supply chain. the identification of criteria related to the implementation of SCPSs may be challenging. Further, the AHP based analysis uses supply chain professional inputs, thus, it is recommended for executing the procedure meticulously. The employed AHP approach has several noticeable weaknesses such as vagueness, uncertainty and bias. However, in future study, fuzzy AHP may be used to eliminate the inherent lack of preciseness and unreliability (Goninan et al., 2015a). This study presents a single case study. Multiple case studies may be conducted in the future perspective. The proposed AHP based analysis model may also be expanded to various industry sectors such as the automotive, manufacturing or power industry, which are mainly known for having a substantial impact on the supply chain performance strategies on different types of commercial activities. Finally, in future studies, the identified criteria in the SCPS can be analyzed using other related decision making approaches like ISM, ANP, ELECTRE, TOPSIS, DEMATEL and VIKOR (Kannan et al., 2009; Jindal and Sangwan, 2013; Govindan et al., 2015b, 2015c; Xia et al., 2015; Awasthi and Kannan, 2016; Govindan and Jepsen, 2016).

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# APPENDIX A

*Scale in pairwise comparison.*

| Importance Intensity | Preference Judgement |
|---|---|
| 1 | Equally Important |
| 3 | Moderately Important |
| 5 | Strongly Important |
| 7 | Extremely Important |
| 9 | Extremely more Important |
| 2, 4, 6, 8 | Intermediate values between adjacent values |

Source: Saaty (1980)