SOBIE : PROCEEDINGS OF ANNUAL MEETINGS 2015

Compiled and Edited by:

Dr. Vivek Bhargava
Florida Gulf Coast University

Proceedings of the Society of Business, Industry and Economics (SOBIE) Annual Meetings
April 15 – 17, 2015
Destin, Florida

PAPERS

ABSTRACTS

Global Logistics and the Merchant Marine Act of 1920: Asset or Liability Today?

Robert F. Cope III, Southeastern Louisiana University
Rachelle F. Cope, Southeastern Louisiana University

Abstract

Due to recent changes in global shipping, we investigate the Merchant Marine Act of 1920, also known as The Jones Act. When constructed, our governing body decided that the Act was necessary for the country's naval defenses and for proper growth of foreign and domestic commerce. The plan was for the fleet to be owned and operated privately by citizens of the United States. However, in today's economic conditions some are wondering if The Jones Act is a liability to foreign commerce. In our work, we explore the positive effects of naval defense and port issues as well as the negative effects on commerce and transportation infrastructure. To conclude, we offer opinions for policy changes to create a level playing field for the U.S. to compete in global logistics.

Introduction

European bound cargo from Asia has several options for reaching its destination. These for example, include going west over many treacherous mountain ranges or crossing several seas and pass through the Suez Canal. Customs stops are required by many countries along the route, making the trip quite long and segmented. Another route would be to cross the Pacific Ocean, pass through the Panama Canal, and then cross the Atlantic Ocean to get there. A third option would be to go east across the Pacific Ocean, cross the U.S. by rail or highway, then cross the Atlantic Ocean to reach Europe. This path takes the freight through only one country, requiring only one customs check point. To decide, shippers must balance several factors in calculating the best route for individual shipments – fuel costs, type of cargo, time and distance. It is obvious that the last option may be longer in miles, but stands to be shorter in time, prompting those in the global transportation industry to refer to it as a "land bridge" across the U.S. When time is the constraining factor, the U.S. "land bridge" is the option most used.

However, changes in fees to pass through the Panama Canal coupled with U.S. west coast port traffic and the restrictions of The Jones Act have led some container shipping companies to rethink their Asia to Europe routes. Maersk, the world's largest container shipping company, plans to stop moving goods from Asia to the U.S. east coast via the land bridge and the Panama Canal (Bloomberg, 2013). Maersk, and other shippers like Neptune Orient Lines Ltd. plan to use larger ships and reduce the speed of their fleet to become more competitive. Maersk's strategy goes a step further and abandons the Panama Canal altogether in favor of passing more profitably through the Suez Canal. Such changes to global shipping routes are likely to have a significant impact to logistics and the use of transportation infrastructure in the U.S.

Having studied the U.S. land bridge previously (Cope et al, 2014) and having no control over rates charged by the Panama Canal, we focus our work on The Jones Act and its affect on U.S.

logistics and global shipping. We explore the positive effects as well as the negative effects of the law as it pertains to economic growth vs. social well being. To conclude, we offer opinions for policy changes for the U.S. to compete in global logistics.

The Jones Act

The Merchant Marine Act of 1920, commonly referred to as The Jones Act, is a U.S Federal statute that regulates maritime commerce in U.S. waters and between U.S. ports (Brackins, 2009). Two parts of The Jones Act are of specific importance. The first part heavily supports American built, owned, and staffed ships. This was accomplished by restricting shipping and passenger trade within the U.S. to American-owned or American-flagged ships, and specified that at least 75% of a ship's crew must comprise American citizens. In the second part of The Jones Act, the use of foreign parts and labor in ship construction and repair was also greatly restricted. This section of the Act was created to produce a strong, well-staffed merchant marine that could be responsible for efficiently serving the U.S. (Smith, 2010).

The Jones Act – Pros and Cons

Regulated industries lend themselves to the timeless arguments involving economic growth vs. social well being (Bowersox et al, 2007). With The Jones Act, the U.S. shipping industry is no different. There are those who believe in strong commerce and GDP growth, and there are those who believe in the need for a strong national defense.

The intent and purpose of the Act has been specifically outlined in its preamble:

> "It is necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States shall have a merchant marine of the best equipped and most suitable types of vessels sufficient to carry the greater portion of its commerce and serve as a naval or military auxiliary in time of war or national emergency, ultimately to be owned and operated privately by citizens of the United States; and it is declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine" (1800JonesAct, 2008).

It is important to realize that at the time in which The Jones Act was enacted, a strong, resilient merchant fleet was crucial for a country's success. The U.S. was recognizing its great need for a dependable defense fleet, and World War I proved their concerns true. The infant U.S. Navy did not possess the capability of performing this function, and thus relied on the civilian sector for the transport of military cargo to overseas destinations (Brackins, 2009).

However, in a 1993 study, the International Trade Commission indicated that The Jones Act costs the U.S. a total of $3.1 billion per year (Boyd, 2010.). If that study were repeated today, the results would be astounding. Likewise, some feel that eliminating only the "built in the United States" requirement, not the entire Act, would align coastwise cabotage laws with similar laws which protect U.S. air and highway industries. Both the motor carrier and the airline industries are somewhat protected from foreign competition but are not required to purchase equipment built exclusively in the U.S. (Kennebec Captain, 2010). This discrepancy has therefore lead to the overall lessened use and relative unimportance of the water transportation industry in today's economy.

Effects of The Jones Act have been felt widely in the shipping industry. In comparison to other nations that lack such cabotage restrictions, there has been a noticeable decline in the U.S. shipping fleet and loss of competition to other nations (Brackins, 2009). Table 1 below lists many of the pros and cons of the Act.

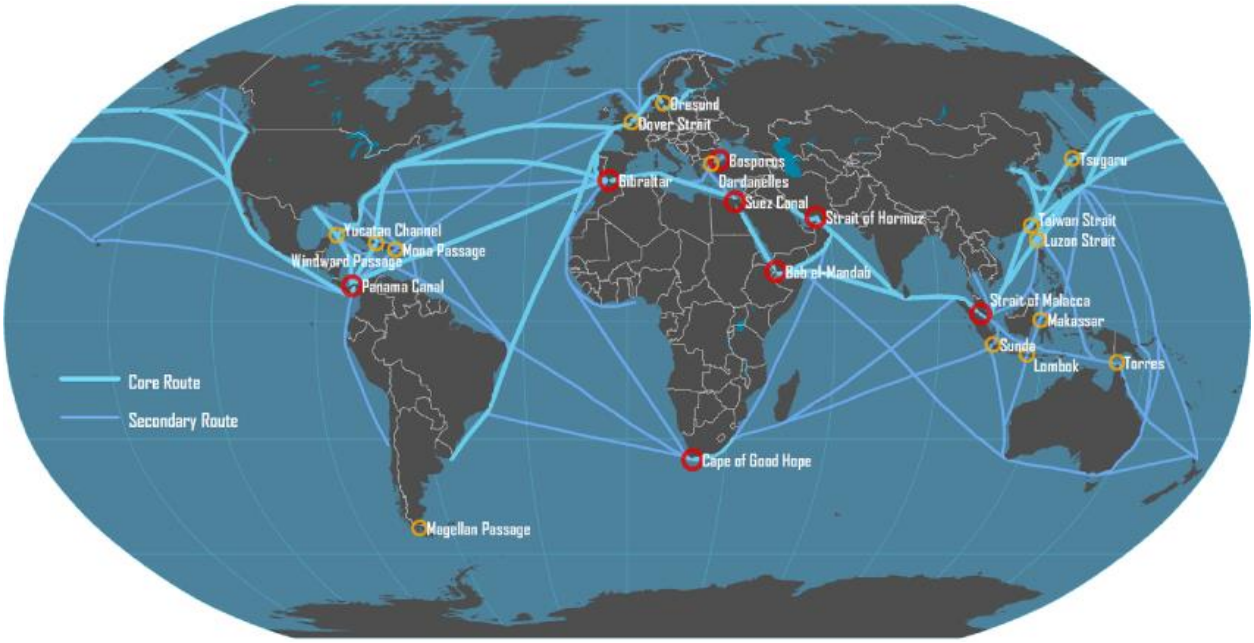
Table 1
Pros and Cons of The Jones Act
(Lee, 2011; Michaeli, 2014; West Coast Sailor, 2014; Magee, 2000)

PROS	CONS
Provides not only increases in union jobs but manufacturing jobs where equipment is built	Cost of building vessels domestically hinders transportation by water between U.S. ports
Blocks foreign control of ships	Increases trucks on highways leading to more traffic and pollution
Has provided 40,334 vessels	Gives competitive advantage to existing foreign ship operators
Has provided 499,676 related jobs	Higher crew costs
Responsible for $100.3 billion in economic output	Difficulty in finding investors who must be U.S. citizens
Generated $11.4 billion in federal, state and local taxes	U.S. shipbuilding industry cannot provide enough reliable ships at an affordable price to comply with Jones Act
Supports national security since U.S. ships are not government subsidized	Caused U.S. Merchant Marines to drop from 2000 ships to 140 or less since World War II
Companies building tugs and barges for petroleum products may go to China without Jones Act.	U.S. is not able to take full advantage of efficient marine highway system and widening of Panama Canal

The U.S. Land Bridge and the Panama Canal vs the Suez Canal

Taking U.S. west coast congestion, cabotage restrictions of The Jones Act, and increased fees through the Panama Canal, Maersk has determined that the economics are much better via the Suez Canal simply because they can use half the number of ships to move cargo. Maersk intends to send vessels from Asia through the Suez Canal to Europe (a trip that is 4-5 percent longer) that carry as many as 9,000 TEUs at a time, instead of using two 4,500 TEU vessels through the Panama Canal (Bloomberg, 2013). Fees for ships to go through the Panama Canal have tripled over a five year period to $450,000 per passage for a vessel carrying 4,500 TEUs (Bloomberg, 2013). This new strategy of using larger, slower vessels has the potential to change global container shipping lanes. Figure 1 below indicates today's major shipping lanes across the globe. Imagine them without the Panama Canal and the U.S. land bridge.

Figure 1
Major Shipping Lanes of Today
(Rodrigue et al, 2009)



Politics to Date

Senator John McCain, who is currently serving as chairman of the Senate's Armed Services Committee, argues that a repeal of The Jones Act could save consumers approximately $ 1 billion annually (Robert, 2014). In June of 2010 and January of 2015, Senator John McCain presented legislation that would allow for a repeal of the Act. According to McCain, The Jones Act:

> "Hinders free trade and favors labor unions over consumers. Specifically, The Jones Act requires that all goods shipped between waterborne ports of the United States be carried by vessels built in the United States and owned and operated by Americans. This restriction only serves to raise shipping costs, thereby making U.S. farmers less competitive and increasing costs for American consumers" (Marinelog, 2010).

Recently, he introduced an amendment on the Senate floor to repeal portions of the Act. His proposal this time was to eliminate the requirement that the United States build their own ships, a case that supports the arguments of many oil refiners, manufacturers, and state governments. That legislation is facing tough opposition based on the fact that the Act protects U.S. industries from foreign competition. McCain's supporters argue that the opposite effect may be true. Based on a comparison of U.S. shipbuilding exports compared to exports of U.S. semis and trailers, shipbuilding comprises on about 2.4% of that market (Riley, 2015). There are other flaws in the logic of The Jones Act. Why does the U.S. require a ban on foreign-built vessels for commercial purposes to fulfill defense needs when there is no ban on foreign-built aircraft, cars, and trucks? In addition, the U.S. Department of Defense has leased foreign vessels to fulfill missions requiring additional sealift capacity (Riley, 2015).

Senator McCain is unyielding in his efforts to eventually gain the needed support of the repeal. His stance is that the detrimental effects on U.S. infrastructure, transshipment of goods between domestic ports, road traffic, pollution, and U.S. investment prove that the repeal of The Jones Act ultimately benefits American consumers (Riley, 2015).

Conclusions and Future Research

There are some who feel that eliminating only the "built in the United States" requirement of The Jones Act, not the entire Act, would align coastwise cabotage laws with similar laws which protect United States' airlines and trucking industries. Both the trucking and the airline industries are somewhat protected from foreign competition but are not required to purchase equipment built exclusively in the United States (Kennebec Captain, 2010). This discrepancy has therefore lead to the overall lessened use and relative importance of the short sea shipping industry to today's economy.

On the other hand, proponents of The Jones Act argue that the regulations are necessary in order to maintain job protection and prevent the loss of jobs to foreign competitors, who charge less than fair wages for jobs that are similar to those performed by U.S. workers. In regards to national defense, they also claim that transporting war material exclusively in United States' flagged ships is crucial to the country's overall protection and success.

It is our hope that all parties seek a win-win resolution to some of the antiquated components of The Jones Act. Though it was drafted over ninety years ago, it has stood the test of time and still sparks arguments between economic growth and social benefits. It is obvious that an overhaul is necessary so the U.S. shipping industry can compete on a level trading field with the rest of the world. If not, the U.S. transportation industry is about to enter a period of significant change in container cargo movement.

We plan to continue this research by exploring more of the economic effects on commerce associated with shifts in global shipping routes. We would like to at least partially update the 1993 finding of the International Trade Commission, and look for evidence to support or refute the $1 billion per year savings in transportation costs argues by Senator McCain.

References

1800JonesAct (2008). The Jones Act U.S.C. Title 46 (Recodified 2006). July 14, 2008 from http://www.1800jonesact.com/ maritime_statutes/default.asp.

Bloomberg. "Maersk Line Ships Will No Longer Transit Panama Canal" *gCaptain Maritime & Offshore News*, March 11, 2013, from http://gcaptain.com/maersk-line-ships-longer-transit/.

Bowersox, D., D. Closs, and M. Cooper. *Supply Chain Logistics Management*, 2nd edition, 2007, Boston, Massachusetts: McGraw-Hill Irwin.

Boyd, L. "The Jones Act: What Does it Cost?" July 2009, from http://clear.uhwo.hawaii.edu/jonesact.html.

Brackins, D. "The negative effects of The Jones Act on the economy of Hawaii" July 25, 2009, from http://www.hawaiiliberty chronicles.com/?p=2237.

Cope, R., R. Cope and J. Woosley. "Evaluating Container Ship Routes: A Case for choosing between the Panama Canal and the U.S. Land Bridge" *International Journal of Research in Business and Technology*, 2014, Vol. 4, No. 2 (April), 395-401.

Kennebec Captain, Blog. "Jones Act Hinders Short Sea Shipping" November 20, 2010, from http://kennebeccaptain.blogspot.com/2010/07/jones-act-hinders-short-sea-shipping.html.

Lee, R. "Shipping Execs Argue Pros and Cons of Jones Act" *Stamford Advocate.com*, May 12, 2011.

Magee, K. "U.S. Cabotage Laws: Protective or Damaging?" *Monterey Institute of International Studies*, Master's Project, 2000, from www.commercialdiplomacy.org/ma_jprojects/images.htm.

Marinelog. "McCain Introduces Legislation to Repeal Jones Act" July 16, 2010, from http://www.marinelog.com/DOCS/ NEWSMMIX/2010jun00252.html.

Michaeli, D. "Foreign Investment Restrictions in Coastwise Shipping: A Maritime Mess" *New York Law Review*, June 2014, 1048-1087.

Riley, B. "Senator McCain's Jones Act Amendment: Good for America" *The Daily Signal*, January 16, 2015, from http://dailysignal.com2015/01/16/senator-mccains-jones-act-amendment-good-for-america/.

Robert, J. "Senator McCain vows Jones Act will be repealed one day" *Reuters*, December 5, 2014, from www.reuters.com/article/2014/12/05/us-usa-jonesact-mccain-idUSKCNOJJ24Q20141205.

Rodrigue, J-P., C. Comtois and B. Slack. *The Geography of Transport Systems*, 2nd edition, 2009, London, England: Routledge (Taylor & Francis Group).

Smith, S. "What is The Jones Act?" *WiseGeek*, July 13, 2010, from http://www.wisegeek.com/what-is-the-jones-act.htm.

West Coast Sailor. "Maritime Administrator: The Jones Act Moves Industry and America's Economic Prosperity" San Francisco, CA, 2014, Vol. LXXVII, No. 10 (October).

Doing Statistical Analysis with Spreadsheets

Jerzy Letkowski
Western New England University

Abstract

VisiCalc, Lotus 1-2-3 and Quattro Pro had their days followed by long and almost absolute dominance of Microsoft Excel. In terms of the spreadsheet functionality, Excel has reached a state close to perfection as a problem solving software tool. Its operation is fast, smooth and efficient. It is equipped with a reach set of build in functions and services. It can virtually be infinitely extended by means of its macros (VBA). Today, which is around year 2015, an explosion of new spreadsheet alternatives is happening with interesting new solutions provided for different systems, ranging from Windows, through OS X, iOS, Linux, to Android and others. This paper attempts to explore capabilities of the most popular alternatives: Google Sheets and Open Office Calc with respect to solving statistical problems. Its focus is on spreadsheet solutions for doing both the descriptive and inferential Statistics, using built-in functions.

Introduction

Business Statistics is one of many popular courses taught within business curricula. A wide range of textbooks exists to support such courses some of which provide exclusive support for Excel as the primary computational tool (Anderson, at al., 2011), (Donnelly, 2014), (Jaggia, 2012), (Levine, at al., 2013). Many other text book give students opportunities to apply Excel and statistical packages such as MINITAB (Black, 2011), (Doane & Seward, 2010), (Larose, 2010), (Pelosi & Sandifer, 2003) and/or SPSS (McClave, at al., 2012), (Sharpe, at al., 2011). Other instructional materials act as guides or references (Dretzke, 2011) as well as cases for applying Excel to solve statistical problems (Pelosi, at al., 1996, 1998), (Letkowski, 2012, 2014).

Despite overwhelming usage and coverage of Excel, other alternatives become more viable. For example, in the author's classes, all students receive instructions for completing case studies in Excel, but increasingly more students elect to do their work, using other statistical programs, predominantly—Apache OpenOffice Calc (OpenOffice Calc, 2015) or Google Sheets (Google, 2015). Other worth mentioning contenders are LibreOffice (LibreOffice, 2015), whose spreadsheet package Calc is equipped with lots of statistical functions, including basic probability distribution functions. Beal (2015) evaluated 5 "mature", open-source alternatives to Excel, listing OpenOffice Calc and LibreOffice as top 2 of the five. Other three options include NeoOffice for Mac OS X, Google Docs (an online, browser based solution) and KOffice (available for all common operating systems).

This paper focuses on three popular spreadsheet programs: Excel (XL), and Google Sheets (GS), and OpenOffice Calc (OC). It examines basic functionality (without add-ins or plug-ins) of the programs with respect to meeting objectives for an introductory course in Statistics.

Spreadsheet Applications for Probability

Assessing probabilities for typical events and random variables, using spreadsheets is quite straightforward. The three spreadsheet programs, explored in this paper, provide lots of computational power, including formula development and specialized function[i].

The probability rules of Addition, Multiplication along with conditional probabilities, including the Bayes Theorem, can be easily applied in spreadsheets by means of formulas, involving basic arithmetic and logical expressions. As an example, consider a marketing case presented in (Levine, at al., 2013, p. 172):

> *You can apply Bayes' theorem to the situation in which M & R Electronics World is considering marketing a new model of televisions. In the past, 40% of the new-model televisions have been successful, and 60% have been unsuccessful. Before introducing the new model television, the marketing research department conducts an extensive study and releases a report, either favorable or unfavorable. In the past, 80% of the successful new- model television(s) had received favorable market research reports, and 30% of the unsuccessful new- model television(s) had received favorable reports. For the new model of television under consideration, the marketing research department has issued a favorable (positive) report. What is the probability that the television will be successful?*

Figure 1 captures Excel-based input and output for this problem, where cell D12 returns the probability in question according to the Bayes Theorem:

$$P(S|P) = P(P|S) \cdot P(S) \;/\; [P(P|S) \cdot P(S) + P(P|U) \cdot P(U)].$$

D12 =$C5*D5/($C$5*D$5+C6*D$6)

	A	B	C	D	E	F
1	Input					
2				Report		
3				Positive	Negative	
4	New TV		Prior	P	N	Total
5	Successful	S	40%	80%	20%	100%
6	Unsuccessful	U	60%	30%	70%	100%
7						
8				Posterior		
9				Report		
10				Positive	Negative	
11	New TV			P	N	
12	Successful	S		64%	16%	
13	Unsuccessful	U		36%	84%	

Figure 1. An Excel implementation of a Bayes Theorem's application.

A similar solution can be developed, using Google Sheets (GS) and OpenOffice Calc (OC) (Letkowski, 2015, Bayes Application).

More complex probability problems may require combinatorial analysis and formulas. The three spreadsheet program provide a similar support (Table 1).

Table 1. Combinatorial functions.

Function	**Excel (XL)**	**Google Sheets (GS)**	**OpenOffice Calc (OC)**
Factorial and Full Set Permutations	FACT(n)	FACT(n)	FACT(n)
Subset Permutations	PERMUT(n, m)	COMBIN(n,m)*FACT(n)	PERMUT(n; m)
Subset Permutations with Repetition	PERMUTATIONA(n; m)		PERMUTATIONA(n; m)
Combinations	COMBIN(n, m)	COMBIN(n, m)	COMBIN(n; m)
Subset Combinations with Repetition	COMBINA(n; m)		COMBINA(n; m)

Notice that GS does not have a specialized function for calculating the number of permutations of size `m` selected from a set of `n` elements with repetitions as well as the number of combinations of size `m` selected from a set of `n` elements with repetitions, provided by other programs as `PERMUTATIONA()` and `COMBINA()`, respectively. However, these functions can be implemented by the following formulas: `=n^m` and `=COMBIN(n+m-1,n-1)`, respectively.

An interesting application of the `COMBIN()` function is to assess the probability of hitting the **Powerball**® jackpot? Five numbers are selected from the set of numbers (1, 2, …, 59) plus one number (Powerball) from the set of numbers (1, 2, …, 35). Since each of the combination of 5 numbers selected from the 59 numbers can be combined with 1 of the 35 numbers, the total number of the combinations in a single **Powerball**® game is `=35*COMBIN(59,5) = 175,223,510`. Thus the probability in question is equal to `0.000000005706996738051 87` (Letkowski, 2015, Powerball).

Although not as powerful as professional statistical programs (MINITAB, SPSS, SAS, R, etc.), the three spreadsheet programs provide significant support for applications of typical probability distributions (Table 2).

Table 2. Probability Distribution Functions

Probability Distribution	**Excel (XL)**	**Google Sheets (GS)**	**OpenOffice Calc (OC)**
Beta	BETA.DIST(x,α, β,cum,[a],[b]) BETA.INV(p,α, β,[a],[b])		BETADIST(x; α; β; [a]; [b]; cum) BETAINV(p; α; β; a; b)

Binomial	BINOM.DIST(k,n,p,cum) BINOM.INV(n,p,a) BINOM.DIST.RANGE(n,p,k_1, [k_2])	BINOMDIST(k, n, p, cum) CRITBINOM(n, p, a)	BINOMDIST(k; n; p; cum) CRITBINOM(n; p; a) B(n; p; k1; k2)
$\chi 2$	CHISQ.DIST(x,df,cum) CHISQ.DIST.RT(x,df) CHISQ.INV(p,df) CHISQ.INV.RT(p,df)		CHIDIST(x; df) CHISQDIST(x; df; cum) CHISQINV(p; df) CHIINV(p; df)
Empirical (Discrete)	PROB(x, p, [start], [end])	PROB(x; p; start; [end])	PROB(x; p; start; [end])
Exponential		EXPONDIST(x, λ, cum)	EXPONDIST(x; λ; cum)
F	F.DIST(x, df_1, df_2, cum) F.INV(p, df_1, df_2) F.DIST.RT(x, df_1, df_2) F.INV.RT(p, df_1, df_2)	F.DIST(x, df_1, df_2, cum) F.DIST.RT(x, df_1, df_2)	FDIST(x; df_1; df_2) FINV(p; df_1; df_2)
Gamma	GAMMA.DIST(x; α; β; cum) GAMMA.INV(p; α; β)		GAMMADIST(x; α; β; cum) GAMMAINV(p; α; β)
Hypergeometric	HYPGEOM.DIST(x; n; M; N)	HYPGEOMDIST(x, n, M, N)	HYPGEOMDIST(x; n; M; N)
Lognormal	LOGNORM.DIST(x, μ, σ, cum) LOGNORM.INV((x, μ, σ)	LOGNORMDIST(x, μ, σ) LOGINV(x, μ, σ)	LOGNORMDIST(x; μ; σ) LOGINV(p; μ; σ;)
Normal (Gaussian)	NORM.DIST(x, μ, σ, cum) NORM.INV(p, μ, σ) NORM.S.DIST(x,cum) NORM.S.INV(p) GAUSS(x) PHI(x)	NORMDIST(x, μ, σ, cum) NORMINV(x, μ, σ) NORMSDIST(x) NORMSINV(x)	NORMDIST(x; μ; σ; cum) NORMINV(p; μ; σ) NORMSDIST(x) NORMSINV(p) GAUSS(x) PHI(x)
Poisson	POISSON.DIST(x, λ, cum)	POISSON(x, λ, cum)	POISSON(x; λ; cum)
T	T.DIST(x, df,cum) T.INV(p, df) T.DIST.2T(x, df) T.INV.2T(p,df) T.DIST.RT(x, df)	TDIST(x, df, tails) TINV(p, df) T.INV.2T(p, df) T.INV(p, df)	TDIST(x; df; cum) TINV(p; df)
Weibull	WEIBULL.DIST(x, k, λ,cum)	WEIBULL(x, k, λ, cum)	WEIBULL(x; k; λ; cum)

XL and OC implement a similar set of the distribution functions. GS does not support four quite important distribution functions: Beta, $\chi 2$, F-inverse, and Gamma. This deficiency can be overcome by developing custom functions written in JavaScript or by utilizing GS' `ImportData()` function. The latter is a powerful tool that can take advantage of HTTP services. Letkowski (2012) shows how to use this function to retrieve a value of a $\chi 2$ critical value (inverse of the $\chi 2$ probability distribution) from the following PHP service:
`http://doingstats.com/srv/chsqr.php?df="&F16&"&alpha="&F17`, where `F16` and `F17` are cell references for values of parameters `df` (degrees of freedom) and α (the upper tail probability). The `ImportData()` function is applies as follows:

```
=ImportData("http://doingstats.com/srv/chsqr.php?df="&F16&"&alpha="&F17)
```

This technique has another important advantage. It allows for spreadsheet applications to be distributes among many world-wide Web locations while sharing data functionality.

There are many probability distributions that are not supported by the three spreadsheet programs. Table 3 shows just a few unimplemented functions.

Table 3. Selected probability distributions that are not sported by XL, GS and OC.

Erlang, *F(x, λ, k)*:	$f(x)=\frac{\lambda^k x^{k-1} e^{-\lambda x}}{(k-1)!}$ $F(x)=P(X\le x)=1-\sum_{i=0}^{k-1}\frac{1}{i!}e^{-\lambda x}(\lambda x)^i, x\ge 0$
Triangular *F(x, a, b, c)*:	$F(x)=P(X\le x)=\begin{cases} 0 & for \quad x<a \\ \frac{(x-a)^2}{(c-a)(b-a)} & for \quad a\le x\le b \\ 1-\frac{(c-x)^2}{(c-a)(c-b)} & for \quad b<x\le c \\ 1 & for \quad x>c \end{cases}$
Trapezoidal *F(x, a, b, c,d)*:	$F(x)=P(X\le x)=\begin{cases} 0 & for \quad x<a \\ g\frac{(x-a)^2}{b-a} & for \quad a\le x\le b \\ g[b-a+2(x-b)] & for \quad b<x\le c \\ 1-g\frac{(d-x)^2}{d-c} & for \quad c<x\le d \\ 1 & for \quad x>d \end{cases}$ where $g=\frac{1}{d+c-a-b}$

The Erlang's random variable is the sum of k random variables having an Exponential distribution with the same parameter λ. Thus by setting k to 1, "Erlang" becomes "Exponential". Moreover, by allowing the k parameter to take on real values, the Erlang distribution transforms itself into a Gamma distribution. Spreadsheet implantations of the above distributions are provided by Letkowski (2015, Erlang, Triangular, Trapezoidal). The Erlang probabilities are calculated in a GS spreadsheet, utilizing the following JavaScript function:

```
function ErlangDist(x, k, lambda) {
  var sum = 1.0;
  var z = 1.0;
  var b = lambda * x;
  for(j=1; j<k; j++) {
```

```
    z = z * b / j;
    sum = sum + z;
  }
  return 1-Math.exp(-b) * sum;
}
```

The Triangular probabilities are crunched in an OC spreadsheet, utilizing the following formula:

```
=IF(_x<_a;0;
   IF(_x<=_b;(_x-_a)^2/((_c-_a)*(_b-_a));
      IF(_x<=_c;1-(_c-_x)^2/((_c-_a)*(_c-_b));1)))
```

Finally, the Trapezoidal probabilities are calculated in an Excel spreadsheet via the following formula:

```
=IF(_x<_a,0,
  IF(_x<=_b,_h * (_x - _a) ^ 2 / (_b - _a),
    IF(_x<=_c,_h*(_b-_a+2*(_x-_b)),
       IF(_x<=_d,1-_h*(_d-_x)^2/(_d-_c),1))))
```

References _a, _b, _c, _d, and _x represent named cells, containing values of the parameters of the distributions.

As shown above, there is plenty of computational power and diversified techniques for assessing probabilities in spreadsheets. There is also plenty of room for sharing and reusing already developed applications.

Spreadsheet Applications for Descriptive Statistics

Descriptive Statistic plays a very important role in solving problems within uncertain situations. Before one can reason and make decisions about such situations, using data that describe the situations, it is usually necessary to organize and/or process the data in order to provide richer, more convenient and more refined characteristics of the relevant aspects of the situations.

Table 3 shows spreadsheet functions for computing most frequently used summary measures. There are a few syntactical differences between some functions implemented by the three spreadsheet programs (XL, GS, and OC). Nonetheless most of the measures can be generated by the programs.

Table 4. Spreadseet functions of summary measures.

Function	Excel	Google Sheets	OpenOffice Calc
Average of the absolute deviations from their mean	AVEDEV(x)	AVEDEV(x)	AVEDEV(x)
Average	AVERAGE(x)	AVERAGE(x)	AVERAGE(x)
Average, including numbers, text, and logical values	AVERAGEA(x)	AVERAGEA(x)	AVERAGEA(x)

Average of values that meet a given criteria	AVERAGEIF (xc, cx, [x])	AVERAGEIF (cx, xc, [x])	AVERAGEIF (cx, xc, [x])
Average of values that meet multiple criteria	AVERAGEIFS (xc1, cx1, [x1], […])	AVERAGEIFS (xc1, cx1, [x1], […])	AVERAGEIFS (xc1, cx1, [x1], […])
Correlation coefficient	CORREL(x,y)	CORREL(x,y)	CORREL(x,y)
Numeric count	COUNT(x)	COUNT(x)	COUNT(x)
Value (alpha-numeric) count	COUNTA(αx)	COUNTA(αx)	COUNTA(αx)
Blank cell count	COUNTBLANK(αx)	COUNTBLANK(αx)	COUNTBLANK(αx)
Counts of values that meet the given criteria	COUNTIF(αx,crit)	COUNTIF(αx,crit)	COUNTIF(αx,crit)
Counts of values that meet multiple criteria	COUNTIFS (αx1,crit1,[…])	COUNTIFS (αx1,crit1,[…])	COUNTIFS (αx1,crit1,[…])
Counts unique values			COUNTUNIQUE (αnx)
Population covariance	COVARIANCE.P(x,y)	COVAR(x,y)	COVAR(x,y)
Sample covariance	COVARIANCE.S(x,y)		
Correlation coefficient	CORREL(x,y)	CORREL(x,y)	CORREL(x,y)
Sum of squares of deviations	DEVSQ(x)	DEVSQ(x)	DEVSQ(x)
Frequency distribution as a vertical array	FREQUENCY(x,bin)	FREQUENCY(x,bin)	FREQUENCY(x,bin)
Geometric mean	GEOMEAN(x)	GEOMEAN(x)	GEOMEAN(x)
Harmonic mean	HARMEAN(x)	HARMEAN(x)	HARMEAN(x)
Kurtosis of a data set	KURT(x)	KURT(x)	KURT(x)
k-th largest value	LARGE(x,k)	LARGE(x,k)	LARGE(x,k)
Maximum value	MAX(x)	MAX(x)	MAX(x)
Maximum value, including numbers, text, and logical values	MAXA(αx)	MAXA(αx)	MAXA(αx)
Median	MEDIAN(x)	MEDIAN(x)	MEDIAN(x)
Minimum value	MIN(x)	MIN(x)	MIN(x)
Smallest value, including numbers,	MINA(αx)	MINA(αx)	MINA(αx)

text, and logical values			
Array of the most frequently occurring, or repetitive values	MODE.MULT(x)		
Most common value in a data set	MODE.SNGL(x)	MODE(x)	MODE(x)
k-th percentile of values in a range, where k is in the range 0..1, exclusive	PERCENTILE.EXC(x,p)		
k-th percentile of values in a range	PERCENTILE.INC(x,p)	PERCENTILE(x,p)	PERCENTILE(x,p)
Rank of a value in a data set as a percentage (0..1, exclusive)	PERCENTRANK.EXC (x,v,[sd])	PERCENTRANK.EXC (x,v,[sd])	
Percentage rank of a value	PERCENTRANK.INC (x,v,[sd])	PERCENTRANK.INC (x,v,[sd])	PERCENTRANK (x,v)
Quartile of the data set, based on percentile values from 0..1, exclusive	QUARTILE.EXC(x,k)		
Quartile of a data set	QUARTILE.INC(x,k)	QUARTILE(x,k)	QUARTILE(x,k)
Rank of a number in a list of numbers with average option	RANK.AVG(v,x,[0|1])	RANK.AVG(v,x,[0|1])	
Rank of a number in a list of numbers with top option	RANK.EQ(v,x,[0|1])	RANK.EQ(v,x,[0|1])	RANK(v,x,[0|1])
Sample skewness	SKEW(x)	SKEW(x)	SKEW(x)
Population skewness	SKEW.P(x)		
k-th smallest value	SMALL(x,k)	SMALL(x,k)	SMALL(x,k)
Normalized value	STANDARDIZE (v,μ,σ)	STANDARDIZE (v,μ,σ)	STANDARDIZE (v,μ,σ)
Population standard deviation	STDEV.P(x)	STDEVP(x)	STDEVP(x)
Sample standard deviation	STDEV.S(x)	STDEV(x)	STDEV(x)

Sample standard deviation, including numbers, text, and logical values	STDEVA(αx)	STDEVA(αx)	STDEVA(αx)
Population standard deviation, including numbers, text, and logical values	STDEVPA(αx)	STDEVPA(αx)	STDEVPA(αx)
Mean of the interior of a data set	TRIMMEAN(x,p)	TRIMMEAN(x,p)	TRIMMEAN(x,p)
Population variance	VAR.P(x)	VARP(x)	VARP(x)
Sample variance	VAR.S(x)	VAR(x)	VAR(x)
Sample variance, including numbers, text, and logical values	VARA(αx)	VARA(αx)	VARA(αx)
Population variance, including numbers, text, and logical values	VARPA(αx)	VARPA(αx)	VARPA(αx)
Legend:			
αx	alpha-numeric range	k	integer value
x	numeric range	v	numeric value
xc	numeric range for criteria	crit	criterion
cx	criteria for numeric range	p	percentage value
bin	class interval limits	sd	number of sig. digits

Detail syntax and interpretation of the functions are well explained in the reference (help) documents of the programs. The level of the functional support of three spreadsheet with respect to the summary measures is close to identical. XL functions `COVARIANCE.S()`, `MODE.MULT()`, `PERCENTILE.EXC()` and `SKEW.P()` are unique. GS and OC do not implement them. Google's `COUNTUNIQUE()` does not have equivalent functions in XL or OC.

The programs are flexible enough to make up for the differences. Both GS and OC use function `COVAR` to calculate the population covariance. In order to calculate the sample covariance in GS and OC the value of the population covariance must be multiplied by `n /(n-1)`, where `n` is the sample size. Thus `=COVARIANCE.S(X,Y)` in XL returns the same as `=COVAR(X,Y)*COUNT(X)/(COUNT(X)-1)` in GS and OC. In order to count unique numeric values in XL or OC one can count non zero outcomes of the `FREQUENCY()` function in which the bin range is the same as the sample: `=FREQUENCY(x, x)`. Examples of such solutions are provided in (Letkowski, 2015, Summary Measures).

More interesting are serious limitations of some of the basic functions. It turns out that the `MODE()` function, in whichever shape or form, does not return the modal value as expected from its probabilistic definition, according to which the mode is a value that maximizes the density function. Letkowski (2014, A) shows many examples of incorrect assessment of this important summary measure by the spreadsheet `MODE()` function. A correct way of estimating the mode for continues data or for grouped-discrete data should be based not directly on a sample but on the frequency distribution derived from the sample (Krysicki, 2006, p.17):

$$(b_{k-1}, b_k] : fn_k = \max_i \{fn_i\} \Rightarrow \text{mode} = b_{k-1} + w \frac{fn_k - fn_{k-1}}{(fn_k - fn_{k-1}) + (fn_k - fn_{k+1})}$$

where b_k is the right limit of the kth class interval, w is the interval width, and fn_i is the absolute frequency of the ith interval. If the maximum is unique then the $(b_{k-1}, b_k]$ interval is referred to as the modal class interval. If the frequencies immediately to the left and to the right of the modal interval are identical, then the midpoint, $mx_k = (b_{k-1} + b_k)/2$, of the modal interval becomes the mode. If the data domain (population) is bottom unbounded then the absolute frequencies can be computed reliably by the `FREQUENCY()` function. Otherwise the `COUNTIF()` function must be employed (Letkowski, 2014, B). Spreadsheet examples of correct derivations of the modal value for a sample drawn from a continuous population are shown in (Letkowski, 2015, Mode).

Spreadsheet Applications for Inferential Statistics

Applications of inferential statistics depend heavily on probability distributions. The three spreadsheet programs (XL, GS and OC) are equipped with built-in probability functions (Table 2) for all basic probability distributions used in introductory Statistics courses[ii]. Common inferential tasks, such as hypothesis tests, that utilize critical values (percentiles) or probability values (p_v) can be setup using one the following probability distributions: Normal, Student-t, χ^2, F. As shown above, these distributions are supported directly or indirectly by XL, GS, and OC. The following examples show how to obtain critical values (z_{crit}) and probability values (p_v) for these distribution with at a significance level α.

The Normal Distribution (z_s is a value of the standardized test statistic)

Left-Tail:

XL: `zcrit =Norm.S.Inv(α),` `pv =Norm.S.Dist(zs,True)`

GS, OC: `zcrit =NormSInv(α),` `pv =NormSDist(zs)`

Two-Tail:

XL:
```
zcrit =Abs(Norm.S.Inv(α/2)),
pv =2*Norm.S.Dist(-Abs(zs),True)
```

GS, OC: `zcrit =Abs(NormSInv(α/2)),` `pv =2*NormSDist(-Abs(zs))`

Right-Tail:

XL: z_{crit} =Norm.S.Inv(1-α), p_v =1-Norm.S.Dist(z_s,True)
GS, OC: z_{crit} =NormSInv(1-α), p_v =1-NormSDist(z_s)

Tests requiring the Normal distribution can be conducted in all three spreadsheet programs. One has to pay attention to the minor syntactical differences (as shown above). Examples for one-sample *t*-test are provided in (Letkowski, 21015, Hypothesis Testing for the Mean).

Additionally, function `ZTest()` can be used to find out the p-value of a `Z` test. It returns the p-value for the right-tail test of the mean. The following examples show how to use it for any tail:

Left-Tail: p_v =1-ZTEST(x,μ_0,σ)

Two-Tail: p_v =2*(1-ZTEST(x,μ_0,σ))

Right-Tail: p_v =ZTEST(x,μ_0,σ)

Parameters x and μ_0 stand for the sample range and hypothesized mean, respectively. In XL, identical results can also be obtained, using function Z.TEST().

T-tests are also well supported by the three spreadsheet programs. They involve the Student-*t* distribution.

The Student-*t* Distribution (t_s is a value of the standardized test statistic)

Left-Tail:

XL: t_{crit} =T.Inv(α,df), p_v =T.Dist(t_s,df,True)

GS: t_{crit} =T.Inv(α,df), p_v =TDist(-t_s,df,True)

OC: t_{crit} =-TINV(2* α;df), p_v =TDIST(-t_s;df;1))

Two-Tail:

XL: t_{crit} =T.Inv.2T(α,df), p_v =T.DIST.2T(ABS(t_s),df)

GS: t_{crit} =T.Inv.2T(α,df), p_v =TDIST(ABS(t_s),df,2)

OC: t_{crit} =TINV(α;df, p_v =TDIST(-t_s;df;2)

Right-Tail:

XL: t_{crit} =T.INV(1-α,df), p_v =1-T.Dist(t_s,df,True)

GS,: t_{crit} =T.INV(1-α,df), p_v = TDIST(t_s,df,1)

OC: t_{crit} =TINV(2*α,df), p_v =TDIST(t_s;df;1)

It is imperative to pay attention to many syntactical differences (as shown above). Examples for one-sample *t*-test are provided in (Letkowski, 21015, Hypothesis Testing for the Mean).

In order to run tests for differences between means of two populations, function `TTest(x1,x2,tails,type)` can be employed, where x_1, x_2 are sample ranges, `tails` equals to "1" or "2", and `type` can be "`1-paired`", "`2-populations with equal variances`", and "`3--populations with unequal variances`". Examples for two-sample *t*-tests are provided in (Letkowski, 21015, Comparing Means of Two Populations).

Tests for variances utilize the F distribution which is fully supported by XL and OC. Surprisingly, GS does not have a function to calculate the inverse of the F distribution.

The F Distribution (f_s is a value of the test statistic)

Left-Tail:

XL: f_{crit} =F.INV(α,df_1,df_2), p_v =F.DIST(f_s,df_1,df_2,True)

GS: f_{crit} =N/A p_v =F.DIST(f_s,df_1,df_2,True)

OC: t_{crit} =FINV(1-α;df_1;df_2), p_v =1-FDIST(f_s;df_1;df_2)

Two-Tail:

XL: $f_{L\text{-}crit}$ =F.INV(α/2,df_1,df_2), $f_{U\text{-}crit}$ =F.INV(1-α/2,df_1,df_2)
p_v =IF(σ_1<σ_2,2*F.DIST(f_s,n_1-1,n_2-1,1),2*F.DIST.RT(f_s,n_1-1,n_2-1))

GS: f_{crit} =N/A
p_v =IF(σ_1<σ_2,2*F.DIST(f_s,n_1-1,n_2-1,1),2*F.DIST.RT(f_s,n_1-1,n_2-1))

OC: $f_{L\text{-}crit}$ =FINV(1-α/2;df_1;df_2), $f_{U\text{-}crit}$ =FINV(α/2;df_1;df_2)
p_v =IF(σ_1<σ_2,2*(1-FDIST(f_s,n_1-1,n_2-1)),2*FDIST(f_s,n_1-1,n_2-1))

Right-Tail:

XL: f_{crit} =F.INV(1-α,df_1,df_2), p_v =F.DIST.RT(f_s,df_1,df_2)

GS,: f_{crit} =N/A p_v =F.DIST.RT(f_s,df_1,df_2)

OC: f_{crit} =FINV(α,df_1,df_2), p_v =FDIST(f_s;df_1;df_2)

If data samples are provided, the p-value (p_v) can also be calculated for two-tail tests, using function `F.Test(x1,x2)`, where `x1`, `x2` are the sample ranges. Notice that some textbooks (Levine, 2013, p. 369-372) do not provide the left tail option, working with the assumption that the test static (f_s) is not less than 1. F-test decisions must be made with GS only based on the p-value. Examples of F tests are shown in (Letkowski, 2015, F-Test).

Goodness-of-fit and independence tests are conducted, using the χ^2 distribution. This distribution is well supported by XL and OC.

The χ^2 Distribution (χ_s is a value of the test statistic)

Left-Tail:

XL: χ_{crit} =CHISQ.INV(α,df), p_v = CHISQ.DIST(χ^2_s,df,True)

GS: N/A

OC: χ_{crit} =CHISQINV(α;df), p_v =CHISQDIST(χ^2_s,df)

Two-Tail:

XL: $f_{L\text{-}crit}$ =CHISQ.INV(α/2,df), $f_{U\text{-}crit}$ =CHISQ.INV(1-α/2,df)

GS: N/A

OC: $f_{L\text{-}crit}$ =CHISQINV(α/2;df), $f_{U\text{-}crit}$ =CHISQINV(1-α/2;df)

Right-Tail:

XL: χ_{crit} =CHISQ.INV(1-α,df), p_v =CHISQ.DIST.RT(χ^2_s,df)

GS,: N/A

OC: χ_{crit} =CHIINV(α;df), p_v =CHIDIST(χ^2_s,df)

Typically, the right-tail test critical values and probabilities (p_v) are used to test variable independence, goodness of fit, etc. Again, it is always advisable to check the up-to-date references in order to apply appropriate syntax. Examples for χ^2 tests are shown in (Letkowski, 2015, Chi-Square Test). Notice that the χ^2_s critical value is calculated in GS, using the `ImportData()` function shown above. In XL and OC, the p-value for independence tests can also be calculated by means of the CHITEST(af_1,of_2) function, where af_1 and of_2 are actual and observed frequencies, respectively.

Conclusion

This paper was set to explore only the function based solution to solving typical statistical problems. In addition to a rich collection of built-in functions, presented in this paper, the spreadsheet programs provide command or macro based opportunities. It is important to note that macro-based solutions can take advantage of both local and external (network) resources. GS makes the external access particularly easy by means of the `ImportData()` function presented above.

Arguably, spreadsheets represent the most commonly used software in business. This is why there are many other software solutions that attempt to work with rather than compete against spreadsheets. Many statistical textbooks select Excel enhanced by add-ins that fill gaps that exist in the common spreadsheet programs. Professional software developers have also recognized spreadsheet opportunities. Oracle (2015) provides and add-in for Excel to enable data import and export from and to MySQL. Probably the most noteworthy statistical extension of Excel is provided

by an R based add-in, RExcel, (Heiberger, 2009). As an open-source statistical package, R is becoming more and more popular "*...thanks to a boost from big data application development...*" (Krill, 2014). Currently, home and academic edition of RExcel is only available for a 32-bit installation of Excel. Spreadsheet programs and R should be considered as programs complementing one another even if they are not tightly integrated. Deficiencies of the spreadsheet programs with respect to graphics and to handling more sophisticated statistical tests and procedures can be compensated by R. An excellent coverage of R that goes along with intuitive but rigorous introduction to the probability theory is provided by (Baclawski, 2008).

References

Anderson, D. R., Sweeney, D. J., Thomas A. Williams, T. A. (2011). Essentials of Modern Business Statistics with Microsoft Excel (5th edition). Cengage Learning, December 12, 2011.

Apache (2015). OpenOffice Calc . Retrieved from: https://www.openoffice.org/product/calc.html.

Baclawski, K. (2008). Introduction to Probability with R. Chapman & Hall/CRC, Taylor & Francis Group.

Beal, V. (2012). 5 free open source alternatives to Microsoft Office. PCWorld, September 17, 2012. Retrieved from: http://www.pcworld.com/article/2010005/5-free-open-source-alternatives-to-microsoft-office.html

Black, K. (2011). Business Statistics: For Contemporary Decision Making (7th edition). John Wiley and Sons, Inc., October 25, 2011.

Doane, D., Seward, L. (2010). Applied Statistics in Business and Economics (3rd edition). Mcgraw-Hill/Irwin, January 1, 2010.

Donnelly, R. (2014). Business Statistics (2nd edition). Pearson, January 19, 2014.

Dretzke, B. (2011). Statistics with Microsoft Excel (5th edition). Pearson, October 7, 2011.

Google (2015). Google Sheets. Retrieved from: http://www.google.com/sheets/about/.

Heiberger, R. M., Neuwirth, E. (2009). R Though Excel. A Spreadsheet Interface for Statistics, Data Analysis, and Graphics. Springer, 2009.

Jaggia, S., Kelly, A. (2012). Business Statistics: Communicating with Numbers (1st edition). McGraw-Hill/Irwin, January 6, 2012.

Krill, P. (2014). R, Swift soar in language search popularity in 2014. InfoWorld, Dec 9, 2014. Retrieved from: http://www.infoworld.com/article/2857133/application-development/r-swift-soar-in-language-popularity-in-2014.html

Krysicki, W., Bartos, J., Dyczka, W., Królikowska, K., Wasilewski, M. (2006). Rachunek Prowdopodobieństwa i Statystyka Matamatyczna w Zadaniach. Warszawa, Wydawnictwo Naukowe PWN.

Larose, D. T. (2010). Discovering Statistics. W. H. Freeman and Company, 2010.

Levine, D. M., Stephan, D. L., Szabat, K. A. (2013). Statistics for Managers Using Microsoft Excel (7th edition). Pearson Education, Inc., January 21, 2013.

Letkowski, J. (2012). Developing Poisson probability distribution applications in a cloud. AABRI Journal of Case Research in Business and Economics, Volume 5. (http://www.aabri.com/jcrbe.html).

Letkowski, J. (2014, A). In Search of the Most Likely Value. AABRI Journal of Case Studies in Education, Volume 5 (http://www.aabri.com/jcse.html).

Letkowski, J. (2014, B). A spreadsheet based derivation of the probability distribution from a random sample. AABRI Journal of Business Cases and Applications, Volume 11 (http://www.aabri.com/jbca.html).

Letkowski, J. (2015). Resource references for this paper. Retrieved from: http://letkowski.us/pub/conference/sobie/2015/sandestin/

Letkowski, J., Letkowski, N. (2015). Learning problem solving with Excel, Access and MySQL. Academic and Business Research Institute Conference, Savannah, March 26-28, 2015.

McClave, J. T., Benson, P.G., Sincich, T. T. (2012) Statistics for Business and Economics (12th edition). Pearson, December 31, 2012.

Oracle (2015). MySQL for Excel. Retrieved from: https://www.mysql.com/why-mysql/windows/excel/

Pelosi, M., T. Sandifer, T. M., Letkowski J. (1996). Doing Statistics with Excel for Windows Version 5.0. An Introductory Course Supplement for Explorations in Data Analysis", John Wiley & Sons, Inc., April 26, 1996.

Pelosi, M., T. Sandifer, T. M., Letkowski J. (1998). Doing Statistics with Excel 97. Software Instruction and Exercise Activity Supplement", John Wiley & Sons, Inc., February 1, 1998.

Pelosi, M., T. Sandifer, T. M. (2003). Elementary Statistics: From Discovery to Decision. John Wiley and Sons, Inc., January 10, 2003.

Salkind, N.J. (2012). Excel Statistics. A Quick Guide (2nd edition). SAGE Publications, Inc. November 26, 2012.

Sharpe, N. D., De Veaux, R. D., Velleman, P. (2011). Business Statistics (2nd edition). Pearson, January 6, 2011

Triola, M.F. (2013). Elementary Statistics Using Excel (5th edition). Pearson, February 21, 2013.

[1] The scope of this paper is limited to basic functionality of Excel, Google Sheets and OpenOffice Calc. However, each of the programs can be expanded by means of scripting (programming) languages (Excel VBA, Google Apps Scripts, and Java, respectively). Such a capability makes is possible to solve even very sophisticated problems. Thus, for example, if there are some functions missing, they can be added to the programs as custom-built functions.

[2] As shown in the Spreadsheet Applications for Probability section, GS does not support some of the basic probability functions but it can import such functions via HTTP services.

The Effect of Measurement Error on the Performance of Attributes Control Charts

Kenneth W. Linna
Auburn University Montgomery

Abstract

The literature contains several studies concerning the effects of measurement error on variables control charts, but similar work on attributes charts is so far lacking. A measurement error model for evaluating the run length performance of the p-chart under measurement system error is suggested. It is shown that the presence of measurement error slows the responsiveness of the p-chart to shifts in the underlying fraction nonconforming. Control chart design recommendations are offered to mitigate the effects of measurement error.

Introduction

The p-chart is a well-known and commonly used Shewhart-type control chart that monitors the fraction of nonconforming process output over time (e.g., Montgomery (20xx)). The chart operator obtains samples of process output of size *n* at regular time intervals and plots the sample fraction nonconforming, $\widehat{p_i} = x_i/n$, against control limits, where x_i is the sample count of nonconforming items. For the standards given case, which is assumed here, the control limits are generally taken as $p \pm z_{\alpha/2}\sqrt{p(1-p)/n}$, where α is the desired false alarm rate. A sample which produces a value of $\widehat{p_i}$ that falls outside the control limits is said to produce a signal of an out-of-control situation.

The performance of any control chart is typically described in terms of some characteristic of the run length variable, where run length refers to the number of consecutive sampling intervals until the first (or next) signal is produced. For the standards given case, successive sampling events are independent, and the run length is therefore a geometric random variable with parameter p = P(signal). The average run length, or ARL, is then $1/p$.

The effect of measurement error has been examined extensively in the control charting literature, but the study has focused exclusively on the performance of variables control charts. Kanazuka (1986) considered the joint power of the $\overline{X}$ and *R* charts to detect a process shift in the vector (μ, σ^2). He noted that in the presence of measurement error, the power of the joint $\overline{X}$ and *R* charts is diminished relative to the error-free case and suggested that larger sample sizes be used to recover the lost power. He also provided expressions for determining appropriate sample sizes. Walden (1990) also studied the effect of measurement error on the average run length of several control charts, including the $\overline{X}$ chart, the R chart, the joint $\overline{X}$ and R charts, and the $\overline{X}$ chart with runs rules. Walden also recommends increasing sample sizes to compensate for the loss of power induced by measurement error. Mittag (1995) and Mittag and Stemann (1998) used the same model as Kanazuka (1986), but considered the *S* chart instead of the *R* chart. Linna and Woodall (2001) investigated the effect of measurement error relative to a generalized linear covariate measurement model. They also note that the effect of measurement error is ultimately a reduction in the

magnitude of the signal generated by a parameter shift in the quality variable. Maravelakis et al (2004) considered measurement error's effect on the function of the EWMA chart.

In the next section, a measurement error model is proposed for analyzing the performance of attribute charts. Calculations are performed which allow evaluation of the negative effects of measurement error. Some examples and recommendations concerning measurement system and control chart design conclude the paper.

Proposed Measurement Error Model

The variable quality characteristic, *X*, the value of which determines whether an item is conforming, is assumed here to have a normal distribution with mean μ_0 and standard deviation σ_0 when the process is in control. If an item is conforming so long as the quality characteristic falls between two specification limits, say LSL and USL, then the probability that a given item is conforming is $P(LSL < X < USL)$. If we take LSL = $\mu + \omega_1\sigma_0$ and USL = $\mu + \omega_2\sigma_0$, then the in-control probability of a nonconforming item can be expressed as $p_0 = 1 - \Phi(\omega_2) + \Phi(\omega_1)$, where $\Phi(\cdot)$ is the standard normal cumulative distribution function. If the process mean shifts from μ_0 to $\mu_1 = \mu_0 + \delta\sigma_0$, then the probability of a nonconforming item is $p_1 = 1 - \Phi(\omega_2 - \delta) + \Phi(\omega_1 - \delta)$.

Many authors have observed that it is generally impossible to directly observe any characteristic of interest without incurring some degree of measurement error. The measurement error model assumed here is that a measurement variable, Y, is used to monitor the process and is linearly related to the quality characteristic X as follows: $Y = A + BX + \varepsilon$, where A and B are known constants, and ε is distributed independently of X as a normal random variable with mean 0 and standard deviation σ_ε. Then the measurement variable Y has a normal distribution with mean $A + B\mu$ and standard deviation $\sqrt{B^2\sigma_0^2 + \sigma_\varepsilon^2}$.

If the specification limits are translated so that $P(LSL^* < Y < USL^*) = P(LSL < X < USL)$ for the in-control case, then LSL* = $A + B\mu_0 + w_1\sqrt{B^2\sigma^2 + \sigma_\varepsilon^2}$ and USL* = $A + B\mu_0 + w_2\sqrt{B^2\sigma^2 + \sigma_\varepsilon^2}$. This choice of specification limits is not required from a process monitoring performance perspective, but it has the desirable property of providing an unbiased estimate of the true process fraction nonconforming, p_0, when the process is operating in-control. Accordingly, the probability that an item is classified as nonconforming via a single measurement under this system is given as

$$1 - P\left(\frac{A+B\mu_0+w_1\sqrt{B^2\sigma_0^2+\sigma_\varepsilon^2}-(A+B\mu_1)}{\sqrt{B^2\sigma_0^2+\sigma_\varepsilon^2}} < Z < \frac{A+B\mu_0+w_1\sqrt{B^2\sigma_0^2+\sigma_\varepsilon^2}-(A+B\mu_1)}{\sqrt{B^2\sigma_0^2+\sigma_\varepsilon^2}}\right).$$

If we define $\gamma^2 = {\sigma_\varepsilon^2}/{B^2\sigma_0^2}$, this probability can be simplified as

$$p_1^* = 1 - \Phi\left(w_2 - \frac{\delta}{\sqrt{1+\gamma^2}}\right) - \Phi\left(w_1 - \frac{\delta}{\sqrt{1+\gamma^2}}\right). \quad (1)$$

It can be seen from equation (1) above that for $\delta = 0$ that the probability of a nonconforming item is equal to p_0. We also note that, for a centered process, i.e., $-w_1 = w_2$, p_1^* is always less than p_1.

Run Length Performance of the p-chart Under Measurement Error

Using the translated specification limits as defined in the previous section, the control limits for the p-chart are given as $p_0 \pm z_{\alpha/2}\sqrt{p_0(1-p_0)/n}$, where α is the desired false alarm rate and p_0 is the in-control process fraction nonconforming. At time i, a sample of n items is measured, and the number of nonconforming items, say d_i, is observed. The sample proportion nonconforming $\hat{p}_i = d_i/n$ is plotted against the control limits. An out-of-control condition is indicated for any value of $\hat{p}_i$ which plots outside the control limits. Under the assumptions previously given, d_i is a binomial random variable with parameters n and p_0 when the process is operating in-control. When the underlying process mean shifts to μ_1, the binomial fraction non-conforming based on the measurement system is $p_1^* = 1 - \Phi\left(w_2 - \frac{\delta}{\sqrt{1+\gamma^2}}\right) + \Phi\left(w_1 - \frac{\delta}{\sqrt{1+\gamma^2}}\right)$. Therefore, the probability of a signal is given as $P\left(d_i > np_0 + z_{\alpha/2}\sqrt{np_0(1-p_0)}|p_1^*\right) + P\left(d_i < np_0 - z_{\alpha/2}\sqrt{np_0(1-p_0)}|p_1^*\right)$. The average run length, or ARL, is $1/P(signal)$. The following tables provide ARL values for an assortment of values of p_0, γ^2, and δ. It can be observed in the tables that the average run length required to detect a shift in the fraction nonconforming is longer for the cases when measurement error exists. This effect is greater for larger values of relative measurement error variance. Further, it can be observed that the shift in the apparent value of the fraction nonconforming is smaller than the shift in the actual fraction nonconforming. This latter fact is the ultimate reason for the reduced run length performance induced by the presence and severity of measurement error. It should be noted that all the values cited in the following tables are for processes that are centered with respect to the specification limits.

Table 1. ARL performance of the *p*-chart for several values of γ^2 when p_0 = .02, *n* = 100, and α=.0027. The apparent value of p is given below the ARL in parentheses.

		γ^2				
δ	**True p**	**0**	**0.1**	**0.2**	**0.5**	**1.0**
0.0	0.02000	246.181 (.02000)	246.181 (.02000)	246.181 (.02000)	246.181 (.02000)	246.181 (.02000)
0.1	0.02062	208.889 (.02062)	211.981 (.02056)	214.600 (.02052)	220.502 (.02041)	226.604 (.02031)
0.2	0.02250	131.908 (.02250)	139.121 (.02227)	145.505 (.02208)	160.866 (.02166)	178.261 (.02125)
0.3	0.02568	67.423 (.02568)	74.706 (.02516)	81.540 (.02472)	99.537 (.02376)	122.725 (.02282)
0.4	0.03023	30.904 (.03023)	35.867 (.02928)	40.809 (.02848)	55.145 (.02675)	76.456 (.02504)
0.5	0.03625	13.948 (.03625)	16.737 (.03472)	19.661 (.03344)	28.925 (.03067)	44.718 (.02794)
0.6	0.04386	6.663 (.04386)	8.116 (.04157)	9.700 (.03968)	15.092 (.03557)	25.435 (.03155)
0.7	0.05318	3.538 (.05318)	4.289 (.04994)	5.130 (.04728)	8.148 (.04153)	14.505 (.03591)
0.8	0.06435	2.149 (.06435)	2.544 (.05996)	2.997 (.05636)	4.685 (.04859)	8.501 (.04106)
0.9	0.07751	1.505 (.07751)	1.717 (.07175)	1.966 (.06701)	2.926 (.05685)	5.218 (.04704)
1.0	0.09280	1.204 (.09280)	1.316 (.08541)	1.452 (.07936)	2.006 (.06638)	3.399 (.05391)
1.1	0.11034	1.070 (.11034)	1.124 (.10107)	1.196 (.09349)	1.513 (.07725)	2.371 (.06170)
1.2	0.13022	1.019 (.13022)	1.041 (.11882)	1.074 (.10949)	1.247 (.08954)	1.776 (.07048)
1.3	0.15251	1.004 (.15251)	1.011 (.13873)	1.023 (.12744)	1.109 (.10331)	1.428 (.08028)

Table 2. ARL performance of the *p*-chart for several values of γ^2 when p_0 = .10, *n* = 100, and α=.0027. The apparent value of p is given below the ARL in parentheses.

		γ^2				
δ	**True p**	**0**	**0.1**	**0.2**	**0.5**	**1.0**
0.0	0.10000	203.980 (.10000)	203.980 (.10000)	203.980 (.10000)	203.980 (.10000)	203.980 (.10000)
0.1	0.10170	173.707 (.10170)	176.269 (.10154)	178.433 (.10141)	183.285 (.10113)	188.265 (.10085)
0.2	0.10678	107.688 (.10678)	113.999 (.10616)	119.573 (.10565)	132.919 (.10452)	147.884 (.10339)
0.3	0.11523	51.542 (.11523)	57.775 (.11385)	63.667 (.11270)	79.324 (.11016)	99.641 (.10763)
0.4	0.12703	21.521 (.12703)	24.527 (.12458)	29.387 (.12254)	41.177 (.11805)	59.280 (.11354)
0.5	0.14212	8.910 (.14212)	10.882 (.13832)	13.001 (.13514)	19.985 (.12815)	32.561 (.12114)
0.6	0.16043	4.061 (.16043)	4.985 (.15500)	6.019 (.15046)	9.712 (.14044)	17.311 (.13039)
0.7	0.18188	2.189 (.18188)	2.621 (.17456)	3.119 (.16844)	5.005 (.15490)	9.299 (.14128)
0.8	0.20634	1.439 (.20634)	1.643 (.19689)	1.887 (.18898)	2.854 (.17146)	5.233 (.15379)
0.9	0.23365	1.141 (.23365)	1.233 (.22188)	1.349 (.21200)	1.848 (.19007)	3.172 (.16788)
1.0	0.26360	1.035 (.26360)	1.069 (.24934)	1.120 (.23736)	1.369 (.21065)	2.110 (.18352)
1.1	0.29595	1.006 (.29595)	1.015 (.27911)	1.032 (.26490)	1.144 (.23312)	1.553 (.20066)
1.2	0.33043	1.001 (.33043)	1.002 (.31094)	1.006 (.29443)	1.047 (.25734)	1.259 (.21925)
1.3	0.36672	1.000 (.36672)	1.000 (.34457)	1.001 (.32575)	1.012 (.28321)	1.110 (.23921)

Sample Size Recommendations

If it is desired for the chart to respond to shifts in the fraction nonconforming as though there were no measurement error, then in general, the sample size must be increased. If we desire a chart which has the same approximate performance characteristics as the theoretical chart operating in the absence of measurement error, then it is required that the probability of a signal for the chart with measurement error match the signal probability for the idealized chart. We therefore require $P(y_i > USL^*) + P(y_i < LSL^*) = P(x_i > USL) + P(x_i < LSL)$. Assuming an increase in the fraction nonconforming, which is typically of more immediate concern than a decrease, and applying the normal approximation to the binomial distribution, this is roughly equivalent to the following equality: $P\left(Z > \frac{n^*p_0 + z_{\alpha/2}\sqrt{n^*p_0(1-p_0)} - n^*p_1^*}{\sqrt{n^*p_1^*(1-p_1^*)}}\right) = P\left(Z > \frac{np_0 + z_{\alpha/2}\sqrt{np_0(1-p_0)} - np_1}{\sqrt{np_1(1-p_1)}}\right)$, where n^* is the sample size required to overcome the effect of measurement error when the true fraction nonconforming has shifted to p_1. Solutions of this equality for n^* for several values of p_0, δ, and γ^2 are presented in the following tables.

Some general observations can be made concerning the following tables. First, for larger measurement error variance, a larger sample size is required to achieve power equivalent to the case for which measurement error is absent. Also, the effect of measurement error is more pronounced for smaller shifts in the underlying fraction nonconforming than for larger shifts. Finally, the required sample size is generally larger for smaller for smaller values of p_0 for a given value of the shift constant δ.

Table 3. Recommended sample sizes to overcome measurement error effects when $p_0 = .01$, $n = 100$, and $\alpha = .0027$.

		γ^2			
δ	p_1	0.1	0.2	0.5	1.0
0.1	0.0104	154	220	488	1169
0.2	0.0115	150	210	453	1066
0.3	0.0134	145	198	409	935
0.4	0.0162	139	185	365	805
0.5	0.0200	134	174	327	693
0.6	0.0248	130	165	296	603
0.7	0.0309	127	158	272	534
0.8	0.0382	125	153	254	480
0.9	0.0471	123	148	239	440
1.0	0.0577	122	145	229	410
1.1	0.0701	121	143	221	387
1.2	0.0845	120	141	215	369
1.3	0.1011	119	140	211	356
1.4	0.1199	119	139	207	347
1.5	0.1410	119	138	205	341
1.6	0.1646	118	138	204	336
1.7	0.1906	118	138	204	334
1.8	0.2189	119	138	204	333
1.9	0.2496	119	139	204	334
2.0	0.2824	119	139	206	336

Table 4. Recommended sample sizes to overcome measurement error effects when $p_0 = .02$, $n = 100$, and $\alpha = .0027$.

		γ^2			
δ	p_1	0.1	0.2	0.5	1.0
0.1	0.0206	144	195	398	894
0.2	0.0225	141	189	377	833
0.3	0.0257	137	181	348	751
0.4	0.0302	134	172	319	667
0.5	0.0363	130	164	292	591
0.6	0.0439	127	158	270	527
0.7	0.0532	125	152	252	475
0.8	0.0643	123	148	237	434
0.9	0.0775	121	144	226	403
1.0	0.0928	120	142	218	379
1.1	0.1103	119	140	211	360
1.2	0.1302	119	138	206	346
1.3	0.1525	118	137	203	335
1.4	0.1772	118	137	200	328
1.5	0.2044	118	136	199	323
1.6	0.2339	118	136	198	320
1.7	0.2656	118	136	198	318
1.8	0.2993	118	137	198	318
1.9	0.3349	118	137	199	320
2.0	0.3721	118	138	201	322

Table 5. Recommended sample sizes to overcome measurement error effects when $p_0 = .05$, $n = 100$, and $\alpha = .0027$.

		γ^2			
δ	p_1	0.1	0.2	0.5	1.0
0.1	0.0511	134	174	323	675
0.2	0.0546	133	171	312	643
0.3	0.0604	131	166	296	599
0.4	0.0685	128	161	279	550
0.5	0.0791	126	155	262	503
0.6	0.0922	124	151	247	461
0.7	0.1077	122	147	234	425
0.8	0.1259	121	143	223	395
0.9	0.1467	120	141	215	372
1.0	0.1701	119	139	208	353
1.1	0.1960	118	137	203	338
1.2	0.2244	117	136	199	327
1.3	0.2552	117	135	196	318
1.4	0.2881	117	135	194	312
1.5	0.3230	117	135	193	308
1.6	0.3596	117	135	193	306
1.7	0.3976	117	135	193	306
1.8	0.4365	117	135	194	307
1.9	0.4761	118	136	196	310
2.0	0.5160	118	137	198	314

Table 6. Recommended sample sizes to overcome measurement error effects when $p_0 = .10$, $n = 100$, and $\alpha = .0027$.

		γ^2			
δ	p_1	0.1	0.2	0.5	1.0
0.1	0.1017	130	163	287	569
0.2	0.1068	129	161	280	550
0.3	0.1152	127	158	270	523
0.4	0.1270	126	154	258	491
0.5	0.1421	124	151	246	458
0.6	0.1604	122	147	235	428
0.7	0.1819	121	144	225	401
0.8	0.2063	120	141	217	378
0.9	0.2336	119	139	210	359
1.0	0.2636	118	138	204	343
1.1	0.2960	117	136	200	330
1.2	0.3304	117	135	196	321
1.3	0.3667	117	135	194	313
1.4	0.4044	117	134	193	308
1.5	0.4432	117	134	192	305
1.6	0.4827	117	134	192	304
1.7	0.5224	117	135	192	304
1.8	0.5619	117	135	194	306
1.9	0.6009	118	136	196	310
2.0	0.6389	118	137	198	315

Conclusions

Consistent with the prior literature on the effects of measurement error, it is found that the ability of the *p*-chart to produce a signal following a given shift in the fraction nonconforming is reduced in the presence of measurement error. The cause of the reduction in power is the reduction in the apparent shift size when measurement error is present. The obvious strategy for compensating for the presence or extent of measurement error is to increase the sample size. Some sample size recommendations were made for specific cases.

Future research on this topic might consider the case where product conformance is not based on an underlying continuous variable but rather the presence of one or more perhaps subjectively determined characteristics. In this case, measurement error might be quantified as the expected fraction of items that are classified incorrectly. Additionally, the strategy of performing multiple measurements per item should be considered as has been done in other studies.

References

Kanazuka, T. "The Effects of Measurement Error on the Power of $\overline{X} - R$ charts" *Journal of Quality Technology,* 1986, Vol. 18, 91-95

Linna, K.W. and Woodall, W.H. "The Performance of Multivariate Control Charts in the Presence of Measurement Error" *Journal of Quality Technology,* 2001, Vol. 33, No. 2, 213-222

Maravelakis, Petros E., Panaretos, John, Psarakis, Stelios "EWMA Chart and Measurement Error" *Journal of Applied Statistics*, 2004, Vol. 31 (4), 445-455

Mittag, H.-J. "Measurement Error Effects on Control Chart Performance" *ASQC 49th Annual Quality Congress Proceedings*, 1995, 66-73

Mittag, H.-J. and Stemann, D. "Gauge Imprecision Effect on the Performance of the $\overline{X}$ – S Control Chart". *Journal of Applied Statistics*, 1998, Vol. 25, 307-317

Walden, C.T. "An Analysis of Variables Control Charts in the Presence of Measurement Error" Unpublished Master's Thesis, Department of Industrial Engineering, Mississippi State University, 1990, UMI No. 1343291

Lifestyle Discrimination at Work

Suzanne M. Crampton
Grand Valley State University

Abstract

Experts stress the multiple benefits organizations experience by having a diverse work force. There are many forms of workplace diversity included in legislation that protects employees from discrimination under various U.S. federal and many state employment and civil rights laws. Other forms that tend to receive less focus in organizations are weight, appearance, sexual orientation, and lifestyle behaviors (e.g., smoking/tobacco use, physical activity, nutrition, and alcohol consumption). In many cases, these forms fail to be legally protected from workplace discrimination. Consequently, there are many examples where employees feel that they have been mistreated due to one or more of their personal characteristics or lifestyle behaviors, and a newer concept has emerged—*lifestyle discrimination*. Employers are creating policies and monitoring what employees do on their own time. This paper will examine lifestyle issues and the controversy over how much employers should be able to dictate their employees' off-duty behaviors.

Introduction

For years we have heard that an organization's success is greatly influenced by its ability to embrace and value the diversity that exists in the labor market. When organizations actively promote the hiring and retaining of a diverse workforce and prioritize the importance of implementing diversity programs and the positive handling of diversity issues, experts indicate that multiple benefits will be realized. Some of these include diverse knowledge, experience, and skills; increased creativity, innovation and intellectual growth of employees; strengthened customer relationships and services provided; improved social integration and adaptability; and higher productivity and return on investment (Greenberg, 2004; Stone, 2011).

Some of the typical forms of workplace diversity that organizations pay attention to include similarities and differences concerning race, ethnicity, color, gender, age, ability/disability and religion. These are forms that are included in various legislative acts that protect employees from discrimination under U.S. federal and many state employment and civil rights laws. Other forms that are relevant in the workforce are weight, appearance, sexual orientation, and lifestyle behaviors (e.g., smoking/tobacco use, physical activity, nutrition, and alcohol consumption). Workplace diversity can also include personality, education, experiences, cognitive style, socio-economic background, interests and many other characteristics that distinguish us as distinct individuals. In many cases, these are also forms of diversity that fail to be legally protected from discrimination in the workplace. Consequently, there are many examples where employees feel that they have been discriminated against due to one or more of their personal characteristics or lifestyle behaviors, and a newer concept has arisen—*lifestyle discrimination*.

Cases have emerged where employers are monitoring and creating off-duty policies affecting what employers do on their own time. Controversy has been created over how much employers should be allowed to dictate employee lifestyle behaviors and many issues are under debate. Why do employers feel they should be able to dictate off-duty conduct? At what point do an organization's policies cross the line into unethical requirements placed on employees or even illegal discrimination? Should employers be able to discipline employees for engaging in off-duty and off-premises conduct that is legal? What if such behavior had no negative impact on an employee's at-work performance?

Employment-at-Will Doctrine

Protection from lifestyle discrimination refers to protecting employees from employers who impose certain lifestyle requirements as a condition of employment. Many people believe that an employer should not be able to fire an employee for something he/she said or did away from work. However, it appears that U.S. employers have a lot of leeway when it comes to requirements they may impose, and we increasingly hear about employees who have been disciplined or fired for their off-the-job behaviors. In fact, the U.S. is the only major industrial power where a basic tenet of employment is the employment-at-will doctrine. This doctrine presumes that employment is for an indefinite period of time and that an employer or an employee may enter into or terminate the employment relationship for any reason, good or bad, so long as the reason is not an unlawful reason.

In the U.S., states determine the employment relationship that exists and all states except one are classified as at-will states. Montana has statutorily passed the Wrongful Discharge from Employment Act (WDEA) that specifies legal bases for a wrongful discharge. It primarily prohibits discharge for reasons other than good cause and allows employees the right to challenge a termination decision in court or before an arbitrator (Solomon, 2007). In general, since employees in most states are employed at will, there is no law protecting employees from being disciplined or fired for many off-duty behaviors unless a union contract or some other agreement or specific law says otherwise. It should be noted that while most of the U.S. recognizes the at-will doctrine, other countries do not have the at-will concept governing employment relationships. For example, countries such as Canada, Great Britain, France, Germany, Italy, Japan, and Sweden by statute require that employers show good cause before discharging employees (WeirFoulds, 2011).

In the U.S., determining what an unlawful reason is can be complex. Many factors are outlined in federal laws as unlawful reasons for making employment decisions, such as race, religion, national origin, color, gender, pregnancy, age, disability, genetic information, certain medical conditions, and for acting in accordance with various employment laws (e.g., filing an OSHA or discrimination complaint, taking a leave under the Family and Medical Leave Act, questioning compensation practices of an employer, etc.). So just because something regarding an employee might affect an employer's bottom line does not mean that the employer can refuse to hire or can terminate the employee. For example, an employee with a disability that requires a "reasonable accommodation" to perform a job might cost the employer some extra money but would still be protected under the Americans with Disabilities Act (ADA).

It should be noted that many courts and state legislatures have allowed exceptions to at-will employment (e.g., legal contractual obligations may exist; public policy exceptions are recognized). For instance, many state courts have held that an employer should not be allowed to terminate employees for filing a workers' compensation claim after an injury, for refusing to break the law for an employer, or for fulfilling jury duty requirements. In addition, employees have filed suits seeking "constructive discharge" damages which is a situation that exists when an employee alleges he/she was forced to resign because the employer's behavior made life so intolerable and difficult that the employee felt forced to quit. The status of employment-at-will is unclear in some situations due to differences in court rulings and legislative positions on this issue. More wrongful-termination lawsuits are being filed by employees, testing the status of the at-will doctrine and company policies and disciplinary procedures. As a result, more companies are ensuring that at-will clauses are clearly defined in their handbooks and employment contracts, and they are training recruiters and managers to make no statements to their applicants and employees about employment terms (e.g., no statements implying that an employee has a job so long as performance is satisfactory).

Lifestyle Behaviors and Employment Discrimination

It is not unusual to expect employers to establish policies and standards of conduct governing employee behavior and employers expect that employees will follow their policies, not only during working hours but often outside of work as well. Given that "employment-at-will" remains the governing employment doctrine that prevails in the U.S., the trend of monitoring and penalizing employees for off-work behavior will continue. No organization is immune from potentially intruding into their employees' private lives. For example, professional sports leagues have been known to discipline employees for various off-work behaviors (e.g., gambling) (Sugarman, 2003). Examples of disciplinary actions taken by some employers for employees' off-duty behaviors include:

(1) The firing of a BMW salesman for posting photos and comments to Facebook of an embarrassing accident at an adjacent Land Rover dealership (Hill, 2011).
(2) The firing of a University of Alabama's football coach after he was reportedly partying with strippers (Bragg, 2003).
(3) An employee who was punished due to jokes he told at a private retirement party honoring a fellow worker (Mitra Kalita, 2003).
(4) The dean of students at a Catholic school who was forced to resign after his photo and name were found on sexually suggestive websites (Mitra Kalita, 2003).
(5) A Wal-Mart supervisor who was fired for talking on the phone with an employee after work hours about work-related and personal issues (Schepp, 2011).
(6) The firing by Wal-Mart of four workers in China who claimed the company sold food past its sell-by date (Peterson, 2014).
(7) Two employees at a sports bar and restaurant who were fired for not "being loyal enough" after complaining about the bar's tax withholding policies on Facebook (Hill, 2011).
(8) A reporter at the Arizona Sun who was fired "for posting unprofessional and inappropriate tweets to a work-related Twitter account" when he tweeted about his paper's bad copy editors and criticized a local TV news station (Hill, 2011).

(9) A company in Alabama fired a woman in 2004 who drove to work with a Kerry-Edwards bumper sticker (Peters, 2005).

While government employees and employees of public entities have a constitutional right to privacy that protects them from having their employer monitor or inquire about their off-duty conduct, many private employees have few rights to privacy in the workplace. However, when it comes to off-duty monitoring, there are some limitations. An employer cannot intrude on areas in which a person has a reasonable expectation of privacy. For example, an employer cannot physically enter an employee's home without consent, even if the employer alleges the employee has stolen property belonging to the employer. However, if an employee shows up to work inebriated and unable to work and gets disciplined/discharged, most reasonable individuals would not argue that the employer overstepped its boundaries. But should employers' concerns always trump the invasion into off-duty behavior? Before disciplining employees for off-duty conduct, employers must examine the impact the behavior is having on the business and must also determine whether federal or state laws might be relevant. More on this will be discussed in the section below on lifestyle legislation.

Social Media Policies and Employee Monitoring

What about employers monitoring the communications of their employees on various social media sites during non-work hours? There is some protection provided to employees through the National Labor Relations Act (NLRA). Generally, this act makes it illegal for an employer to monitor employee union activities, on or off the job. In addition, this Act protects certain behaviors of both union and non-unionized employees because it applies to any concerted activity where employees are discussing their hours, wages, or terms or conditions of employment. The NLRA also extends this protection to employees' social media posts, such as on Facebook and Twitter, that are related to discussions regarding wages, hours, and working conditions (National Labor Relations Board, 2014). In fact, the National Labor Relations Board (NLRB) has found that some policies and disciplinary actions of employers have been found to violate the NLRA. In a decision issued in 2012 by the NLRB, the Board found the employer illegally discharged five employees for protected concerted activity when they posted communications on Facebook about a coworker who intended to complain to management about their work performance (National Labor Relations Board, 2014).

This seems to be a confusing area for many employers. In a report issued by the NLRB in 2012 regarding social media policies and behaviors, the following two main points were made:

(1) Employer policies should not be so broad to prohibit activity protected by federal law, such as the discussion of wages or working conditions among employees; and
(2) An employee's social media communications are generally not protected if they are "mere gripes not made in relation to group activity among employees" (National Labor Relations Board, 2014).

In the case example mentioned previously regarding the salesman who was fired for posting on Facebook, the Board agreed with the Administrative Law Judge that the salesman was fired

solely for the photos he posted of a Land Rover incident, which was not protected concerted activity.

Smoking and Lifestyle Discrimination

One common lifestyle behavior that is protected in some states is smoking (i.e., tobacco products). Many employers have smoking policies that are enforced in their workplaces so indoor smoking bans are no longer unusual. Gone are the *Mad Men* days of the 1960s where smoking at one's desk was prevalent. Recently Reynolds American, the manufacturer of Camel, Winston, Salem, and Kool cigarettes along with other tobacco products, built designated smoking areas as it phases in non-smoking policies at work (including in conference rooms, elevators, employee offices, hallways, and cafeterias) beginning in January 2015 (McGregor, 2014). The company will, however, continue to allow smokeless products and moist snuff at work (McGregor, 2014). Many college campuses have also implemented smoking bans. In January 2015 Kalamazoo Valley Community College implemented a complete ban and, according to the Americans for Nonsmokers Rights (ANR), it joined the over 1,514 college campuses that are 100 percent smoke free today (and of these 1,014 are tobacco-free and 587 prohibit e-cigarettes on campus (ANR, 2015).

The worksite smoking bans currently in place in most organizations commonly include where and when employees may smoke and whether smoking is allowed at all on company premises. Some of these policies are influenced by legislation that prohibits smoking in public buildings, restaurants, stadiums, etc. In fact, 49.1 percent of the U.S. population is protected by some type of smoke-free workplace, restaurant, and bar law (ANR, 2015). Other employers have implemented restrictions on smoking during working hours due to the ADA (Americans with Disability Act) and concerns that some employees may have allergic reactions or other health impairments resulting from exposure to smoke or where the smoke poses a risk to customers or patients.

Other employers may implement smoking restrictions to improve the health of workers and reduce the cost of medical claims. Most people understand today that private employers can require employees to not smoke during their shift or on company premises, but many question the right to require an employee to not smoke at all during a long shift, or anywhere on or off company property, or any time after the shift has ended and the employee is off the employer's property. Given the addictive nature of smoking, is it realistic and ethical to require a lifestyle change and infringe on the personal habits of an employee while off the clock?

Of concern to many today is the discrimination workers are experiencing by employers who impose what some might consider an extreme lifestyle requirement—that of only hiring non-smokers. This means that if an employee smokes and even limits his/her smoking to off-duty time and off the employer's premises (e.g., the employee smokes in his/her own home on a weekend in a private home), the employee must permanently quit smoking to retain his/her job or face termination. For example, in the 1980s Turner Broadcasting System along with Alaska Airlines banned the hiring of smokers. Since then, many medical facilities have implemented similar bans, including the Cleveland Clinic, Baylor University's Hospital, the Geisinger Clinic, and the University of Pennsylvania Health System in Philadelphia (Kaplan, 2013). It has been reported that over five percent of organizations in the U.S. have implemented anti-smoking policies for current

and future employees and include nicotine testing in their hiring requirements and random drug testing policies; it is expected that this number will continue to increase (Krishef, 2013; McGregor, 2014).

Employees who do not comply with their organization's anti-smoking policies and complete ban on smoking anywhere/anytime have been fired. For example, a medical benefits provider in Michigan, Weyco, requires random testing of employees and searches of briefcases, purses, and other belongings to check for nicotine products; employees are fired if nicotine is found (Armour, 2005). Investors Property Management in Seattle bans the hiring of smokers, and existing employees who smoked were refused the company's medical insurance if they failed to quit. Employees at Alaska Airlines must be tobacco-free (Armour, 2005). Courts have upheld these terminations so long as there is no (state) law protecting the employees. For example, an employee of The Scotts Co. was fired when his drug test came back positive for nicotine but the lawsuit he filed was thrown out when the judge stated his smoking was not protected (Saltzman, 2009).

Employees may also be punished for lying about smoking. This gets to the issue of companies who discriminate against smokers at their organization or offer incentives of some type to nonsmokers. For example, some companies, such as Whirlpool, Macy's, and PepsiCo, reward employees who do not smoke by offering lower medical insurance premiums (McDonough, 2008; Murphy, 2008). In 2008 Whirlpool suspended 39 employees without pay because they had signed a benefit form saying they were nonsmokers, thus receiving $500 in reduced medical premiums, but the employees were later caught smoking or chewing tobacco.

According to the human resources consulting firm Mercer, a 2007 survey found that 16 percent of large employers with at least 20,000 employees adjust the health care premium contributions based on the employee's smoking status (Murphy, 2008). Employers are limited to the changes they can make to a health premium because of the unhealthy habits of workers under the federal ERISA (Employee Retirement Income Security Act), but lying about smoking is not protected by the Act (Murphy, 2008). Many related issues remain controversial such as what if an employee does not smoke but his/her spouse smokes and is on the insurance plan—can this behavior be monitored and rewarded or penalized?

The American Civil Liberties Union sees the refusal to hire a person who smokes on his/her own time as a form of discrimination (Sugarman, 2003). However, employers believe it is their prerogative to decide whom to hire, in the absence of federal, state, or local legislation. No federal law protects smokers from workplace discrimination. However, to date 29 states and the District of Columbia have legislation that offers smokers protections and prohibits employers from banning smokers from employment if they do so outside of their work hours (Wisniewski, 2013).

Other Unhealthy Lifestyle Behaviors

Smoking is only one area that employees feel employers are infringing on their right to choose what they do in the privacy of their own homes. Many legal experts see a trend where companies are trying to control other aspects of their employees' lives outside the workplace. What about employers who have refused to hire overweight applicants or terminate employees if they gain too much weight? A large aspect of the debate on whether employers should be able to have

input into employees' off-duty behaviors tends to surround the topic of health. If employees engage in what an employer considers unhealthy behavior, should the employer have a right or a responsibility to encourage or even dictate healthier lifestyles?

Even if there is justification for employers delving into off-duty behaviors and there are no legal restrictions placed on employers in this area, if the employee is undertaking a legal behavior that an employer prohibits, is the employer's restriction ethical? For example, is it ethical to refuse to hire a smoker or someone who appears to overeat (is overweight) or engages in some other unhealthy behavior given that the behavior is legal (and absent legislation prohibiting discrimination of off-duty behaviors)? If the organization is in the health industry, should that employer have more of a right and even a duty to press employees into making healthier choices?

Experts in the human resource management field argue that employment decisions should be made based on the ability of the applicant to perform the essential functions of the job. By basing decisions on performance credentials and leaving other personal characteristics or lifestyle behaviors of a person out of the decision-making process, it is argued that employers should be able to stay out of legal trouble. However, might some lifestyle behaviors also influence the ability of a person to perform a job effectively? For example, being overweight may be difficult for a person to perform tasks requiring speed and agility. If an employer judges a person unsuitable to perform a job due to his/her weight or the fact that the person smokes, it is possible that such a decision could be viewed as discrimination, despite the lack of discriminatory intent.

Of course, the question still exists as to whether allowing employers to dictate one area of our life (e.g., where and when we can smoke, how much we can weigh) oversteps acceptable boundaries of individual freedom. Who determines what is considered acceptable behaviors? Who enforces the restrictions? What are the ramifications for breaking the prohibited restrictions? "Would this someday lead to the perfect healthy diet that all have to follow or they lose some of their rights or privileges?" (Krishef, 2013). "There are many individual behaviors that would pose a higher risk of some medical condition on the individual who chooses to follow them. Some examples include drinking and liver cirrhosis, certain sexual behaviors and particular health risks, many dietary habits and high cholesterol, hypertension, heart attacks or colon cancer" (Krishef, 2013. Aly section, para 1). Even if some unhealthy habits are more expensive than others to individuals and their employers (e.g., lost productivity, higher medical costs), delving into restricting certain lifestyle behaviors is indeed a slippery slope and could lead to "ethically indefensible hiring sanctions against vulnerable members of society" (Krishef, 2013, My view section, para 1).

Sexual Orientation

There is no federal law in the U.S. prohibiting discrimination based on sexual orientation and gender identity. Some might consider these to be lifestyle behaviors so they are included in this discussion. Several attempts have been made by Congress to add these to our discrimination prohibitions (e.g., Employment Non-Discrimination Act); however, as of today, such protection does not exist. Gender discrimination that is prohibited in Title VII of the 1964 Civil Rights Act does not include sexual orientation or gender identify. President Clinton amended Executive Order 11478 to ban discrimination against federal employees on the basis of sexual orientation (as well as

parental status) and President Obama in 2014 added gender identity as a protected characteristic (Executive Order 11246) (Neal, 2014). However, these protections only apply to federal contractors and subcontractors with contracts worth over $10,000 each year, so it is relevant for approximately one-fifth of the workforce, not all private employers (Neal, 2014). Some additional employers may be included in the nondiscrimination laws prohibiting sexual orientation or gender identity discrimination that exist in 18 states as well as the District of Columbia (Neal, 2014). However, this means that many employers are still allowed to refuse to hire and can discriminate against workers who do not meet certain values the company and its managers espouse.

Hobbies and Other Off-Duty Activities

There are many off-duty behaviors that may conflict with an organization's or executives' values that employees might participate in. These might include various physical activities such as playing sports like football, basketball, hockey, soccer or softball, hiking, skydiving, hang gliding, rock climbing, car/boat/bike racing, etc. Other employee interests may also be frowned upon, such as gambling, drinking, and participating in various political activities. At issue is whether an employer should be able to have a say in their employees' off-duty interests. Employers may take an interest in such activities due to health and injury concerns where the medical costs of injured employees might increase the financial burden on the company as well as the lost work time and lost productivity that could be incurred. In addition, if certain behaviors of employees became public, there might also be a concern regarding the impact on the company's image (e.g., drunken behavior, political protests, etc.).

Another area of controversy that employers often develop policies for deals with employees working a job at another workplace, or moonlighting. While working more than one job is legal, of concern here might be employees who work for a competing organization or establish their own company that competes with their employers' products and/or services. Employers might frown on employees using the training learned at their organization for outside activities. An employer can limit work that conflicts or competes with the business of the employer.

In other cases, work behaviors may violate a company's values or ethical code and again might impact the company's image (e.g., exotic dancing, nude modeling, being a dealer at a casino, etc.). Limiting these work behaviors is more controversial. It is also debatable whether an employer should have the ability to restrict and discipline various employee activities depending on the industry—should an educational or religious institution, the military or law enforcement have a greater say in their employees' off-duty activities?

Lifestyle Legislation and Employee Contracts

While many employers may want to regulate their employees' off-duty behaviors, it is important to note that, as previously discussed, federal legislation on off-duty behaviors exists, though it is somewhat limited (e.g., workers cannot be fired for engaging in certain legally protected activities such as union organizing, whistleblowing, filing a workers' compensation claim and reporting potential safety violations). Also, there are a few states that have passed legislation prohibiting employers from infringing on the private time of employees in varying degrees. Most laws cover both applicants and employees (Burke & Roth, 2011).

Some statutes are fairly broad and prohibit discrimination for any lawful activity by employees conducted during non-working hours and off the company's premises. Examples of states with these laws include California, Colorado, New York, and North Dakota (Burke & Roth, 2011; NOLO, 2014). Other states, such as Illinois, Minnesota, Montana, Nevada, North Carolina and Wisconsin, prohibit discrimination against employees who use lawful products or lawful consumable products (Burke & Roth, 2011). It should be noted that many state laws contain exceptions that allow employers to regulate off-duty conduct if (1) it is related to a bona-fide occupational requirement; (2) it is necessary to avoid a conflict of interest with the employer; and/or (3) use of the legal product affects an employee's ability to perform his/her job duties (Burke & Roth, 2011). For example, in Colorado, it is illegal to terminate an employee for lawful activity during off-duty hours and off the employer's premises unless one of the first two exceptions listed above is present (Sandberg, 2014). Additionally, if employees are using lawful consumable products (e.g., tobacco, alcohol) during non-work time and off the employer's premises, Montana employers are prohibited from refusing to hire applicants or disciplining or terminating such employees, unless at least one of the first two exceptions listed are present (Sandberg, 2014).

Anti-discrimination laws specifically for off-duty tobacco use have been passed in 29 states and the District of Columbia and about half of the states have laws prohibiting discrimination based on an employee's marital status or sexual orientation (Burke & Roth, 2011). There are some states where an employee's arrest record or even some convictions are factors that employment decisions cannot be based on. Employers in certain states and municipalities also cannot make negative employment decisions due to the political activity of their employees (Burke & Roth, 2011). For example, California, Colorado, Guam, Louisiana, Minnesota, Missouri, Nebraska, Nevada, South Carolina, West Virginia, Seattle (Washington), and Madison (Wisconsin) bar employers from retaliating against employees for engaging in political activities. Iowa, Louisiana, the District of Columbia, Broward County in Florida and the city of Urbana, Illinois also forbid employers from discriminating against employees based on party membership (Volokh, 2012). The state of New York prohibits employer retaliation for off duty recreational activities that include such things as reading, and television and movie viewing, along with political activities.

If an employment contract exists it may also regulate employee off-duty conduct by stating that certain violations or convictions might be grounds for dismissal. In addition, labor union contracts may regulate employees' off-duty conduct and prohibit discipline unless there is just cause. According to the director of the AFL-CIO Center for Collective Bargaining in Washington, D. C., most union contracts prohibit termination for off-duty behavior unless job performance is directly affected (Hirschman, 2003).

Conclusion

When faced with off-duty conduct and whether employers can restrict or punish behaviors by their employees, it is important to not only distinguish between lawful and unlawful off-duty conduct but also the impact such conduct has on the business, its customers, other employees, etc. Just because the conduct in question is lawful does not mean an employer must tolerate it. Employers need to ensure they are aware of the federal, state and local protections that exist where their employees work. In some cases there may be legislation that expressly prohibits employers

from taking negative actions against employees for engaging in lawful off-duty conduct (e.g., states with anti-discrimination laws against smokers). If there are laws on lifestyle discrimination, then employers must also examine whether any statutory exceptions are relevant and employers must make sure their corporate policies comply with any statutes that might protect their employees. If an employer is able to justify that the off-duty conduct negatively impacts the business, work performance, or the safety of others, then the employer may legitimately have a claim in addressing such behavior.

It is critical as with any alleged employee misconduct, that the behavior and accuracy of the information be adequately investigated prior to taking any negative action against the employee. If there was a criminal report made, call law enforcement and confirm the identity of the person, the nature of the charges, and the current status of the case ("Employer control," 2012). In other cases, there may not be any third-party report that can be analyzed. Regardless of the situation, an examination of the current facts and case must be made along with the ramifications. Whether the organization decides to retain the employee, punish or suspend the employee, or terminate the employee, it must ensure that any punishment to be given fits prior precedents that might have been set for similar behaviors or rule violations at the company. Employers do not want to be sued for defamation (e.g., spreading false information about someone that is untrue and harms his or her reputation), for discrimination, or for unlawful discharge.

If it is found that the employee is indeed guilty of illegal off-duty behavior, or behavior that violates work rules or negatively impacts the organization, and the employee is punished and/or even terminated for such behavior, the organization should still be careful what it communicates to other employees and to its customers. The organization remains at risk for possible lawsuits and any statements made should be cleared by legal counsel. It is recommended that the organization simply stick to the facts and state that the company is taking appropriate action ("Employer control," 2012). Stay away from detailed discussions or from drawing further conclusions.

Employers must ensure that their supervisors and managers are up-to-date on their companies' policies and on training regarding when and how employees should be disciplined. Under the pressure of economic and other business considerations, employers may try to regulate many aspects of their employees' lives, including diet, hobbies, smoking, drinking alcohol, sleep habits and even childbearing. As more employers are using their employees' paychecks to control what activities and conduct they can undertake in their personal lives, more labor organizations and civil rights groups like the American Civil Liberties Union (ACLU) and the National Labor Relations Board (NLRB) are becoming increasingly outspoken about what should be considered private behavior conducted during non-working hours away from the workplace.

If you think about it, every lifestyle choice a person makes impacts health in some way so at issue is to what extent an employer should be allowed to regulate the lives of employees. Sports activities such as skiing, football, parachuting, sunbathing, motorcycle riding, and even bicycling are all potentially risky behaviors. Despite the fact that we live in a 24/7 society where employers and employees can remain in constant contact with each other seven days a week, 24 hours a day, it is critical that employers not be permitted to regulate employees' lives 24/7. Where should the line be drawn?

References

ANR. (2015). Colleges and universities. *Americans for Nonsmokers Rights.* Retrieved from http://no-smoke.org/goingsmokefree.php?id=447

Armour, S. (2005, May 11). Trend: You smoke? You're fired! *USA Today*. Retrieved from http://usatoday30.usatoday.com/money/companies/management/2005-05-11-smoke-usat_x.htm

Bragg, R. (2003, May 9). In Alabama, where coaches are revered, sinning not tolerated. *The New York Times*. Retrieved from http://www.nytimes.com/2003/05/09/sports/ncaafootball/09alabama.html

Burke, C. & Roth, B. (2011, June 13). Labor: Lifestyle discrimination laws are becoming increasingly prevalent. *Inside Counsel*. Retrieved from http://www.insidecounsel.com/2011/06/13/labor-lifestyle-discrimination-laws-are-becoming-i

Employer control of employee off-duty conduct is limited. (2012, May 24). *BizFilings.* Retrieved from http://www.bizfilings.com/toolkit/sbg/office-hr/managing-the-workplace/employer-control-employee-off-duty-conduct-limited.aspx

Greenberg, J. (2004). Diversity in the workplace: Benefits, challenges and solutions. *The Multicultural Advantage.* Retrieved from http://www.multiculturaladvantage.com/recruit/diversity/diversity-in-the-workplace-benefits-challenges-solutions.asp

Hill, K. (2011, August 25). When you can and can't fire employees for social media misbehavior. *Forbes.* Retrieved from http://www.forbes.com/sites/kashmirhill/2011/08/25/when-you-can-and-cant-fire-employees-for-social-media-misbehavior/

Hirschman, C. (2003, February 1). Off duty, out of work. *HRMagazine, 48*(2). Retrieved from http://www.shrm.org/publications/hrmagazine/editorialcontent/pages/0203hirschman.aspx

Kaplan, J. (2013, March 18). Not hiring smokers. *Albany Medical College.* Retrieved from http://www.amc.edu/bioethicsblog/post.cfm/not-hiring-smokers

Krishef, D. (2013, December 24). Can companies ethically refuse to hire smokers? Overeaters? Ethics and religion talk. *MLive*. Retrieved from http://blog.mlive.com/grpress/opinion_impact/print.html?entry=/2013/12/is_it_ethical_companies_to_ref.html

McDonough, M. (2008, April 23). Whirlpool plant suspends 39 employees caught smoking. *ABA Journal*. Retrieved from http://www.abajournal.com/news/article/whirlpool_plant_suspends_39_employees_caught_smoking

McGregor, J. (2014, October 23). Tobacco company bans smoking in the office. *The Washington Post.* Retrieved from http://www.washingtonpost.com/blogs/on-leadership/wp/2014/10/23/big-tobacco-company-bans-smoking-in-the-office/

Mitra Kalita, S. (2003, February 26). Paul VI School dean resigns over photo on lurid web sites. *The Washington Post*. Retrieved from http://www.highbeam.com/doc/1P2-236979.html

Murphy, T. (2008, May 1). Whirlpool suspends 39 employees for tobacco use. *The Huffington Post.* Retrieved from http://www.huffingtonpost.com/2008/04/23/whirlpool-suspends-39-emp_n_98136.html

National Labor Relations Board. (2014). The NLRB and Social Media. *National Labor Relations Board*. Retrieved from http://www.nlrb.gov/news-outreach/fact-sheets/nlrb-and-social-media

Neal, K. R. (2014, August 31). Amended executive orders expand employment discrimination prohibitions. Lexology. Retrieved from http://www.lexology.com/library/detail.aspx?g=6e9edf8b-393a-4a4d-bd1e-8771ec6fa166

NOLO. (2014). Off duty conduct and employee rights. *NOLO.com*. Retrieved from http://www.nolo.com/legal-encyclopedia/off-duty-conduct-employee-rights-33590.html

Peters, J. W. (2005, February 8). Company's smoking ban means off-hours, too. *The New York Times*. Retrieved from http://www.nytimes.com/2005/02/08/business/08smoking.html?_r=0

Peterson, H. (2014, September 17). Wal-Mart China accused of firing workers who claimed the company was selling expired food. *Business Insider*. Retrieved from http://www.businessinsider.com/wal-mart-china-fires-workers-2014-9

Saltzman, J. (2009, August 8). Smoker who lost job loses in court. *The Boston Globe*. Retrieved from http://www.boston.com/news/local/massachusetts/articles/2009/08/08/smoker_who_lost_job_loses_in_court/

Sandberg, J. B. (2014, April 11). United States: Off-duty conduct can't get you fired. Right? *Mondaq Business Briefing*. Retrieved from http://www.mondaq.com/unitedstates/x/306238/Unfair+Wrongful+Dismissal/OffDuty+Conduct+Cant+Get+You+Fired+Right

Schepp, D. (2011, September 26). Wal-Mart employee fired for chatting with employee after hours. *AOL Jobs*. Retrieved from http://jobs.aol.com/articles/2011/09/26/walmart-supervisor-fired-for-chatting-with-employee-after-hours/

Solomon, G. N. (2007). The Montana Wrongful Discharge from Employment Act, twenty years later. *Glen Solomon Blog*. Retrieved from http://www.glennsolomonblog.com/Post.shtml

Stone, A. (2011, May). Different is good: How diversity can benefit your organization. *Performance Preview*, 25. Retrieved from http://performance.ey.com/wp-content/uploads/downloads/2011/11/EY_performance_Review_pg24-25_Diversity.pdf

Sugarman, S. D. (2003). Lifestyle discrimination in employment. *Berkeley Journal of Employment and Labor Law*, 24(2), 377-438. Retrieved from http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1533&context=facpubs

Volokh, E. (2012). Private employees' speech and political activity: Statutory protection against employer retaliation. *Texas Review of Law & Politics, 16*(295). Retrieved from http://www.trolp.org/main_pgs/issues/v16n2/Volokh.pdf

WeirFoulds LLP. (2011, Fall). *Employment Law in Canada*. Retrieved from http://www.weirfoulds.com/files/9117_WeirFoulds%20-%20Employment%20 Law%20In%20Canada%20(2011).pdf

Wisniewski, D. (2013, February 27). A ban on hiring smokers? It's not that simple. *HRMorning*. Retrieved from http://www.hrmorning.com/ban-hiring-smokers/

Sales Incentives, Vertical Relationships, and Uncertainty

Evan C. Moore, Auburn University at Montgomery
James D. Francisco, Auburn University at Montgomery

Abstract

Abstract: This paper presents the results of 3 differing sales incentives, from the manufacturer, in models involving a manufacturer selling a product to Cournot-type dealerships competing in the retail market. We investigate the effectiveness of these incentives under 2 scenarios: profit maximizing dealers and dealers with an incentive function that is a mix between sales and profits. The optimal sales incentive is discussed.

Introduction and Literature Review

As the saying goes, "the only thing worse than a monopolist is two monopolists." Thus is the problem of double marginalization, first explored by Spengler (1950). The problem arises when a "downstream" monopolist is dependent on inputs from an "upstream" monopolist. The result is a sub-optimal solution from the perspective of both the monopolists, and from a welfare economics perspective. As Spengler noted, however, the welfare losses arise from *horizontal* integration at each respective level, not *vertical* integration.

Indeed, Spengler famously showed that, under conditions of imperfect competition, vertical integration lowers prices by allowing downstream firms to avoid "monopolistic surcharges" (Spengler at 352) from upstream firms. Spengler further noted the following:

> It follows that vertical integration, if unaccompanied by a competition suppressing amount of horizontal integration and if conducive to cost and price reduction, should be looked upon with favor by a court interested in lower prices and a better allocation of resources. (Spengler 1950 at 352).

While Spengler assumed profit maximization at every stage by each firm in his analysis, Fershtman and Judd (1987), drawing upon Baumol (1958) and others examine the possibility of alternative objective functions (such as sales maximization) in an imperfectly competitive environment. Specifically, Fershtman and Judd contemplated mixed objective functions in the context of a principal-agent problem faced by owners seeking to incentivize optimal behavior by managers. Fershtman and Judd found that in an oligopoly situation, owners may wish to provide incentives in order to shift their managers' incentives away from strict profit maximization.

We extend the approaches cited above, by considering the cases of manufacturers interacting with downstream retailers in an imperfectly competitive retail market. Specifically, we examine how such a manufacturer can use sales incentives to encourage dealers to increase sales, with the manufacturer's ultimate aim being to increase its profit. This paper presents the results of 4 different scenarios, in models involving a manufacturer selling a product to Cournot-type dealerships competing in the retail market. These include no sales incentive, a constant, per-unit incentive, a

sales incentive as a proportion of a dealer's own-sales, and an incentive as a portion of the total retail sales of the manufacturer's product.

We build upon the Fershtman and Judd (1987) approach by investigating 2 scenarios: profit maximizing dealers and dealers with mixed objective functions involving a mix between sales and profits. We seek to determine what the optimal sales incentive is from the manufacturer's perspective under the different objective functions, under conditions of uncertainty relating to the retailers' objective function, and conditions of uncertainty with regard to retail demand. Further, in keeping with the Spengler (1950) approach, we determine which solution most ameliorates the welfare problems presented by double marginalization.

Model

Let us consider a case of a manufacturer in an imperfectly competitive market is dependent on sales in the downstream market by retailers under Cournot conditions. We attempt to model two potential forms of an objective function for the dealer: pure profit maximization, as well as a mixed objective function for profit maximization combined with revenue maximization. We start with the inverse retail demand function in a market with *n* retailers:

(1) $P_R = A - BX = A - B\sum x_i, i = 1,...,n$

Where P_R represents the price the retailer receives.

For a pure profit maximization approach, the dealer's objection function would be represented as follows:

(2) $\pi_i = [A - BX]x_i - P_M x_i.$

Where P_M represents the price paid to the manufacturer by the dealer.

The profit maximizing manufacturer faces the following profit maximizing objective function:

(3) $\pi_M = (P_M - C_M)X.$

We first consider the situation in which the dealer operates as a pure profit maximizer according to (2), and the manufacturer offers no incentives. In such a case, maximization of (2) results in the ith dealership's reaction function:

(4) $x_i = \dfrac{A - B\overline{X}_i - P_M}{2B}$, where $\overline{X}_i = X - x_i$. Due to symmetry in dealer output, $\overline{X}_i = (n-1)x_i$.

Solving (3) results in the ith dealership's output of

(5) $x_i = \dfrac{A - P_M}{B(n+1)}.$

and use of (4) in the demand function results in the equilibrium retail price of

(6) $P_R = \dfrac{A + nP_M}{n+1}$.

Use of (3) in equation (5) and maximization of the manufacturer's profit with respect to P_M results in:

(7) $P_M = \dfrac{(A + C_M)}{2}$.

Using (7) in the various equations results in equilibrium results of

(8) $$P_R = \frac{2A + An + C_M n}{2(n+1)},$$

(9) $$x_i = \frac{(A - C_M)}{2B(n+1)},$$

(10) $$P_M = \frac{(A + C_M)}{2},$$

(11) $$\pi_R = \frac{(A - C_M)^2}{4B(n+1)^2},$$

(12) $$\pi_M = \frac{n(A - C_M)^2}{4B(n+1)}.$$

Next, we consider the case of a profit-maximizing manufacturer offering per-unit sales incentives, *d,* to retailers. The general model is presented below and with equations (13) through (16). Such a manufacturer would attempt to maximize π_M *(P_M, d)* subject to the following constraints:

$$\pi_i \geq 0$$
$$x_i \geq 0$$
$$P_R \geq 0$$
$$P_M \geq 0$$
$$d \geq 0$$

This generates the following Lagrangian:

(13) $L(d,\lambda_1, \lambda_2, \lambda_3, \lambda_4)=\pi_M+ \lambda_1\pi_i+ \lambda_2 x_i+ \lambda_3 P_R+ \lambda_4 P_M$

From (13), we obtain the following first order conditions.

(14) $$\frac{\delta L}{dP_M} = 0$$

(15) $$\frac{\delta L}{\delta d} = 0$$

(16) $$\frac{\delta L}{\delta \lambda_i} = 0 \text{ , } i = 1, 2, 3, 4$$

In all cases there is a binding constraint with an interior solution.

We investigate 3 potential options of various per-unit sales incentives from the manufacturer to the dealer. These are a:

1. Constant per unit incentive (*d)*;

2. Per unit incentive a function of an individual dealer's own sales (dx_i);

3. Per unit incentive a function of all dealer sales $\left(d\left(\sum_{i=1}^{n} x_i\right)\right)$.

In the case of pure profit-maximizing dealers, with a constant per-unit incentive, we obtain the following results:

(17) $$P_R = \frac{2A + An + C_M n}{2(n+1)},$$

(18) $$x_i = \frac{(A - C_M)}{2B(n+1)},$$

(19) $$P_M = \frac{(A + C_M)}{2} + d,$$

(20) $$\pi_R = \frac{(A - C_M)^2}{4B(n+1)^2},$$

(21) $$\pi_M = \frac{n(A - C_M)^2}{4B(n+1)},$$

Now, we consider a case of pure profit-maximization in both the manufacturer and retail markets in which the manufacturer offers a per unit incentive (dx_i) that is a function of a dealer's own sales. In that situation, we arrive at the following:

(22) $$P_R = A - \frac{Bn(A - C_M)}{2(B - d + Bn)},$$

(23) $$x_i = \frac{(A - C_M)}{2(B - d + Bn)},$$

(24) $$P_M = \frac{AB(n+1) + C_M(B - 2d + Bn)}{2(B - d + Bn)},$$

(25) $$\pi_R = \frac{(A - C_M)^2(B - d)}{4(B - d + Bn)^2},$$

(26) $$\pi_M = \frac{n(A - C_M)^2}{4(B - d + Bn)},$$

The final incentive structure we consider would be a manufacturer offering an incentive, $\left(d\left(\sum_{i=1}^{n} x_i\right)\right)$, as a function of all sales of the manufacturer's product. We obtain the following results:

(27) $$P_R = A - \frac{Bn(A - C_M)}{2(B - d + Bn)},$$

(28) $$x_i = \frac{(A - C_M)}{2(B - d + Bn)},$$

(29) $$P_M = \frac{C_M(B - d)(n+1) + A(d(n-1) + B(n+1))}{2(B - d + Bn)},$$

(30) $$\pi_R = \frac{(A - C_M)^2(B - d)}{4(B - d + Bn)^2},$$

(31) $$\pi_M = \frac{n(A - C_M)^2}{4(B - d + Bn)},$$

Next we consider a case in which the manufacturer remains a pure profit maximizer, but the dealers adopt mixed objective functions, in which its objectives are partially profit maximization and partially sales revenue maximization. Such an objective is function is given below:

(32) $$OBJ_i = \lambda_i \pi_i + (1 - \lambda_i) P_R x_i .$$

We can now examine the impact of the new mixed objective function on the various incentive structures we have previously discussed. First, we turn back to the no-incentive case. In the mixed objective function context, that would yield the following results:

(33) $$P_R = \frac{2A + n^2(A + C_M)}{2(n^2 + 1)},$$

(34) $$x_i = \frac{n(A - C_M)}{2B(n^2 + 1)},$$

(35) $$P_M = \frac{(A + C_M)}{2},$$

(36) $$\pi_R = \frac{n(A - C_M)^2}{4B(n^2 + 1)^2},$$

(37) $$\pi_M = \frac{n^2(A - C_M)^2}{4B(n^2 + 1)},$$

(38) $$\lambda_i = \frac{nC_M(n + 1) + A(2 - n + n^2)}{(A + C_M)(n^2 + 1)},$$

Next, we examine the case of the constant, per-unit sales incentive *d* in the mixed objective function context. That scenario would yield the following results:

(39) $$P_R = \frac{2A + n^2(A + C_M)}{2(n^2 + 1)},$$

(40) $$x_i = \frac{n(A - C_M)}{2B(n^2 + 1)},$$

(41) $$P_M = \frac{(A + C_M)}{2} + d,$$

(42) $$\pi_R = \frac{n(A - C_M)^2}{4B(n^2 + 1)^2},$$

(43) $$\pi_M = \frac{n^2(A - C_M)^2}{4B(n^2 + 1)},$$

(44) $$\lambda_i = \frac{n(n+1)}{(n^2 + 1)} - \frac{(A + d)(n - 1)}{d + \frac{1}{2}(A + C_M)(n^2 + 1)},$$

Next, we turn to the case of the per-unit incentive as a function of own individual dealer sales, (dx_i). In this case, we obtain the following results:

(45) $$P_R = A - \frac{Bn(A - C_M)(Bn - 2d)}{2\left(2d^2 - Bd(2 + 3n) + B^2(n^2 + 1)\right)},$$

(46) $$x_i = \frac{(A - C_M)(Bn - 2d)}{2\left(2d^2 - Bd(2 + 3n) + B^2(n^2 + 1)\right)},$$

(47) $$P_M = \frac{AB\left(-2d(n+1) + B(n^2 + 1)\right) + C_M\left(4d^2 - 2B(d + 2dn) + B^2(n^2 + 1)\right)}{2\left(2d^2 - Bd(2 + 3n) + B^2(n^2 + 1)\right)},$$

(48) $$\pi_R = \frac{(A - C_M)^2\left(B^3 n - 4d^3 + 4Bd^2(n+1) - B^2 d(2 + 2n + n^2)\right)}{4\left(2d^2 - Bd(2 + 3n) + B^2(n^2 + 1)\right)^2},$$

(49) $$\pi_M = \frac{n(A - C_M)^2(Bn - 2d)}{4(2d^2 - Bd(2 + 3n) + B^2(n^2 + 1))},$$

(50) $$\lambda_i = \frac{C_M\left(4d^2 + B^2 n(n+1) - 2B(d + 2dn)\right) + AB\left(-2d(n+1) + B(2 - n + n^2)\right)}{AB\left(-2d(n+1) + B(n^2 + 1)\right) + C_M\left(4d^2 - 2B(d + 2dn) + B^2(n^2 + 1)\right)},$$

Finally, we consider the case of the dealer offering a per-unit incentive that is a function of all sales of the manufacturer's product to the mixed objective function dealer. Such a case yields the following results:

(51) $$P_R = A - \frac{Bn^2(A - C_M)}{2(B - d + Bn^2)},$$

(52) $$x_i = \frac{n(A - C_M)}{2(B - d + Bn^2)},$$

(53) $$P_M = \frac{C_M(B-d)(n^2+1) + A(d(n^2-1) + B(n^2+1))}{2(B - d + Bn^2)},$$

(54) $$\pi_R = \frac{n(A - C_M)^2(B-d)}{4(B - d + Bn^2)^2},$$

(55) $$\pi_M = \frac{n^2(A - C_M)^2}{4(B - d + Bn^2)},$$

(56) $$\lambda_i = \frac{nC_M(n+1)(B-d) + A(B(2-n+n^2) + d(n+n^2-2))}{C_M(n^2+1)(B-d) + A(d(n^2-1) + B(n^2+1))},$$

Comparison of results from the Manufacturer's point of view

We provide equations (57) – (59) below to allow for useful comparisons with the previous sales incentive results. These equations are the results if the manufacturer is able to retail directly with no retail costs.

(57) $$P_R = P_M = \frac{(A + C_M)}{2},$$

(58) $$X = \frac{(A - C_M)}{2B},$$

(59) $$\pi_M = \frac{(A - C_M)^2}{4B},$$

The use of a constant per unit incentive, *d*, does not result in any change in the manufacturer's profits. This is evident by a comparison of equations (12) with (21) in the profit maximizing dealers scenario. Similarly, with the mixed objective case a comparison of equations (37) and (43) for the mixed objective case reveals in no change in manufacturer profit.

The per unit incentive, which is a function of an individual dealer's own sales, (dx_i) may indeed be profit maximizing but the manufacturer must be certain of the dealers' behavior. If the dealers are profit maximizing then the manufacturer will want to set $d=B$, i.e when the sale incentive piece, *d*, is set equal to the slope of the inverse demand function, *B*. This will result in equation (26) being equal to the manufacturer earning equation (59). However, in the mixed objective case the manufacturer must set the sale incentive piece, *d,* less than *B*. This is evident from equation (49). A

dealer's profit, equation (48), binds if $d = 1/4(2B + Bn - B\sqrt{-4 + 4n + n^2})$, which is a decreasing function of the number of dealers, n. As the dealers are already selling more than they would be if they were profit maximizing, a value of d in excess of the binding value would encourage them to sell too many units, decreasing the manufacturer's profit. If the manufacturer is uncertain of the dealers' behavior then this introduces uncertainty regarding the choice of d.

The use of a per unit incentive that is a function of all dealer sales $\left(d\left(\sum_{i=1}^{n} x_i\right)\right)$. can lead to manufacturer profits equal to those of the manufacturer selling directly to the final consumers with no retailing costs. Note that equations (31) and (55) are equal to (59) when the sale incentive piece, d, is set equal to the slope of the inverse demand function, B. In both the profit maximizing and mixed objective cases the dealers would end up with normal economic profits. Note that it is not important, from the manufacturer's point of view, how whether the dealers are profit maximizing or using mixed objective functions.

Conclusion

We examined how alternative objective functions affect downstream retailer behavior, and how such alternate specifications are impacted by various incentive structures offered by an upstream manufacturer. We find that in both scenarios the optimal solution from the manufacturer's perspective is to create a per-unit incentive that is a function of total dealer sales. Additionally, the market is more efficient as this sales incentive results in greater total surplus due to increased consumer surplus and greater joint profits.

References

Baumol. W. "On the Theory of Oligopoly", *Economica*. 1958, Vol. 25 (99), 187-198.

Fershtman, C. and Judd, K. "Equilibrium Incentives in Oligopoly," *American Economic Review*, 1987, Vol. 77(5), 927-40.

Spengler, J. "Vertical Integration and Antitrust Policy," *Journal of Political Economy*, 1950, 347-352.

Online and Mobile Banking – Security and Support

Morgan Sutherland, Winthrop University
Chlotia P. Garrison, Winthrop University

Abstract

Online and mobile banking growth has been booming as the rapid adoption of smart phone technology has enabled individuals across the world access to the internet and all of its benefits. Banks across the world are shifting their operations online as the costs are lower and profits are higher. But this shift to a digital medium creates a concern as millions of individuals execute transactions containing sensitive data that attract malicious individuals looking to profit from this valuable information. Are banks providing individuals with sufficient information about how they support and secure mobile and online banking? We found that national banks do a good job of supporting mobile banking and in providing information to current and potential customers about their security related to online and mobile banking. Regional banks varied widely in their support and the information they provide.

Introduction

The prevalence of online banking has grown dramatically over the past decade. A Pew Research Center report published in 2013 showed an increase in the number of internet users who bank online from 18% in June 2000 to 61% in July 2013 (Fox, 2013). The older generations have not as readily adopted online banking, most likely due to limited access to the internet with only 56% of U.S. adults age 65 and older reporting they have access to the internet (Fox, 2013). On the other end, online banking is very popular among young adults (18-29) and whites with 66% of them stating they banked online in 2013 (Fox, 2013). This increase in online banking has been fueled by increased access to the internet through mobile devices. A report published by the Federal Reserve in March 2014 on the Consumers and Mobile Financial Services sector found that 87% of the U.S. adult population has a mobile phone and 61% of these phone owners have a smartphone, defined as being internet enabled (*Consumers and Mobile Financial Services 2014*). The future for online and mobile banking is promising as younger users (who make up the majority of online banking use) are readily adopting these technologies. In May 2011, only 18% of internet users mobile banked but by July 2013, this number grew to 35% (Fox, 2013).

The shifting trend towards a more online focused banking system is favored by the major national banks. Almost every bank in the United States now has an online presence that allows users to manage their accounts online. Online banking allows many transactions to be automated without the need for an employee to facilitate the transaction. Profit margins are high as the costs to maintain and conduct transactions within the banks' systems are much lower than operating multiple branches across the country. As a result, some national banks are choosing to close branches. An article in the Wall Street Journal (WSJ) reported that research firms, SNL Financial and AlixPartners, found that U.S. banks and thrifts (savings and loans) shut down 2,267 branches in 2012 alone leading to a total bank-branch count of 93,000 (Sidel, 2015). This tally was the lowest it

has been since 2007 and was expected to continue to drop to 80,000 over the next decade (Sidel, 2015). According to the banks, the primary reasons for these closings was that many of these branches were not profitable and that online operations are proving more profitable (Sidel, 2015). Table 1 shows the number of bank closings for five national banks.

In conjunction with the announcement of 200 branch closing in 2013, William Demchak, CEO of PNC Financial Services Group Inc., told investors that PNC saves $3.88 per transaction each time a customer deposits a check online by using a smartphone to snap a picture (Sidel, 2015). Rob Aulebach, senior vice president in Bank of America's consumer unit, echoed this sentiment stating that "customers are just not coming to the branch as often as they used to" and that "tens of thousands of customers are banking on mobile devices each week (Sidel, 2015)." This trend as shown earlier is being embraced by the younger generations and the banks are making logical decisions to capitalize on it. Why invest in hundreds of individual branches, each requiring numerous employees with specific skill sets, buildings, and complying with unique state regulations, when a global online standardized system that satisfies the majority of your customers' needs could be used instead?

New technologies make life easier. They make businesses more efficient and allow companies to cut costs and reinvest in other areas. However, the focus on shifting consumers to these more efficient online systems also creates a major problem for corporations. A breeding ground for hackers is growing as more and more sensitive information is being stored online by these companies. With access to tremendous capital, one would assume large businesses have some of the best online protection, but as recent news reports have shown even major corporations are vulnerable to security breaches.

Privacy Rights Clearinghouse, an organization that tracks data breaches, reports as of April 10, 2015 that since it began keeping track in 2005, 4,515 public data breaches have occurred leading to over 816 million known records breached (Privacy Rights Clearinghouse). However, for 1,486 of the public data breaches an unknown number of records were breached (Privacy Rights Clearinghouse). Almost every corporation that collects information on its customers (which is every corporation) stores this information in a way that could be potentially accessed remotely. The internet enables the vast transfer of information that can be used to analyze and forecast trends. The power of this information comes with a price however as this sensitive information is very valuable to those who know how to exploit it.

Computer security is often described as a game of cat and mouse. Security experts develop new techniques and technologies to make the hacking process more difficult, but hackers eventually devise ways to bypass these protections. It becomes a never ending game where information security experts need to remain on point detecting any new vulnerabilities and fixing them immediately before they are widely exploited. An example of this can be seen in the Heartbleed security scare. In April 2014, major corporations including Google, Yahoo, Netflix, Facebook, and many others were left scrambling to patch a security vulnerability when an encryption flaw named Heartbleed was found to potentially allow malicious hackers to bypass SSL security encryption and capture sensitive information such as passwords (Kelly et al., 2015). It is unknown how long the flaw existed and how much it was exploited. The online web services industry was dramatically shaken by the news and in response suggested and reminded users that it's good practice to change passwords after periods of time or major security breach events. The impact of stolen passwords is also magnified because many users choose to use the same password for multiple sites for

convenience. Surprisingly all major banks were unaffected by this vulnerability due to using different systems to encrypt user data online (Kelly et al., 2015). However, banks should not be considered impenetrable as JPMorgan Chase reported that over 83 million accounts were breached as a result of a cyber-attack against the bank in 2014 (Segar, 2014).

The costs associated with keeping systems protected and up to date continues to grow. Corporations will need to be mindful about what data they choose to store and how they protect it as the threat of security breaches looms. As the number of breaches increases, it is starting to become less of a question of if and more a when it will happen. The monetary costs of a security breach include federal fines, lost business, additional credit monitoring for each individual customer, and hiring experts to immediately fix the problem. The intangible costs include lost public trust and a damaged reputation which are potentially unredeemable for some consumers. Consumers may even become more reluctant about how much information they give to businesses making it more difficult to gather data to help effectively target and satisfy consumer desires.

Online Banking and Mobile Security

By federal law, all banks are required to use a combination of a username/password system and a secondary authentication method. The most popular secondary measure tends to be a selection of secret questions along with a picture. This type of security has proven mostly effective as multiple forms of authentication make it increasing difficult for malicious individuals to gain access to user accounts. Banks can do all they possibly can to protect customers, but they cannot protect customers from themselves. Most banks provide information on how users can protect themselves and to be wary of certain scams. This information often revolves around educating users on phishing, malware, HTTPS, and good password practices.

Mobile banking apps are growing in popularity as more people take advantage of online and mobile banking. Today banks provide apps for multiple devices. One aspect current and future users will need to take into account when using mobile banking is the safety of wireless networks. Many users prefer to minimize data use and will opt to connect to free or nearby Wi-Fi networks. Any data transferred over a network, including Wi-Fi, can be “sniffed” or stored and viewed. When browsing sites without HTTPS, an outsider can potentially see all the information a user is requesting/sending from/to web servers in plain text. With HTTPS, outsiders are able to see that a user is browsing on the web but all the information they see will be encrypted versus in plain text. Current encryption methods make it extremely difficult (if not impossible) for this information to be decrypted. But security concerns remain because users can still be potentially tricked into revealing sensitive information online. Mobile banking growth exasperates the need to educate users on computer security.

Methodology

The purpose of this study was to learn what security measures banks use to protect their customers, the availability of mobile resources, and what banks do to educate customers on online/mobile security. We also investigate if similarities or distinctions on these efforts exist between the banks.

Forty commercial banks from South and North Carolina were randomly selected (20 from each state) using the Federal Financial Institutions Examination Council (FFIEC) website. Nine major banks (Bank of America, Capital One, Citibank, HSBC, JPM Chase, US Bank, PNC, TD,

Wells Fargo) were also selected. Using the FFIEC, banks were divided into groups based on their average assets from the latest quarter. See Table 2 for the definition of the four peer groups, which range from greater than 1 billion to less than $100 million. Of the NC/SC banks 7 were in Group 1, 5 - Group 2, 13 - Group 3, and 15 - Group 4.

The website of each bank was examined to determine what security measures the bank uses to protect their customers, the availability of mobile resources, and what banks do to educate customers about security. The data was recorded using a checklist for the information in Table 3.

Banks were marked as either 'Yes' for stating the information or showing on the site that a particular security measure was in place. If no information or implementation of a security measure could be found it was recorded as 'Not Stated'. No bank would ever state that a particular security measure was not used but the absence of the information means that customers and potential customers are not being provided that information.

Results

We found that national banks satisfy all questions from the checklist. Each provided a plethora of easily accessible information on how users were protected and how users should protect themselves. Banks from the SC/NC region were not as consistent. All of the regional banks stated or clearly used SSL, did not display full account numbers, and required passwords from users to login each time. When it came to providing security tips, ¾ of the regional banks in the study provided users with this information. Banks were divided on stating whether security questions, firewalls, and auto logoff after a period of inactivity were used. Finally only 1/3 of banks stated that they monitored accounts for fraudulent activity. Table 4 contains a summary of the information for regional banks.

Distinctions between banks did exist between peer groups. Banks were less likely to be as informative and forthcoming about security measures and tips as their average assets for the latest quarter (peer group number) decreased. This may be the result of having fewer resources to spend on developing and maintaining a well-established website. It may also be a reduced focus on security. Figure 1 contains a summary of this information.

Support for mobile apps also followed the average assets trend. While every national bank provided apps for its services, banks in the SC/NC region were less likely to have apps at all. Less than half, 45%, of the 40 regional banks in the study offered mobile apps. If the bank offered apps it was usually a combination of Android and IOS. Only 3 banks provided a Blackberry app and none provided a Windows app. This trend most likely mirrors the smartphone market which is dominated by Android and IOS devices leaving smaller banks with limited resources and little incentive to develop apps for a very small market segment. Every bank offered their mobile apps for free. A favorable trend for consumers which is no doubt a result of the banks wanting users to bank online because of the higher profit margins they achieve with online transactions. Figure 2 shows the mobile apps offered by the regional banks by peer group.

Other miscellaneous information discovered while examining the banking sites were that two banks had an identical security information page. Two additional banks had the same page except with their bank name inserted. The online banking portals for some banks were exact copies of one another which indicates security has been outsourced. Outsourcing online banking is a viable choice for companies that do not have the technical talent to develop these systems on their own but

it highlights a potential problem. If a hacker were to discover an exploit in one system it would most likely be applicable to any other bank that hired the same developer.

Conclusion and Recommendations

Security is a joint responsibility between the user and the corporation. Banks have the responsibility to protect its users' sensitive information and to educate users on computer security. Regional banks can learn from national banks when it comes to setting standards for what type of security information should be presented to users. National banks were much more comprehensive and thorough with the information they provided compared to their regional counterparts. Security is important and well worth the upfront costs that could mitigate or even eliminate future expenses that would result from a breach.

If feasible, banks should consider implementing two-factor authentication which requires the combination of a password and a temporary password. The temporary password is often a code that is emailed or texted to the user. Bank of America is the only bank that mentioned this type of protection on its website. This type of protection makes it extremely difficult for malicious individuals to steal from online banking users. Providing this type of security assists banks in protecting users from themselves because a malicious individual would be left with very small periods of time to penetrate multiple forms of authentication.

To users who bank online or who are looking to bank online in the future, it is recommended that an IOS or Android device be purchased if a mobile app is desired. In Janurary 2015, Bank of America and Chase Bank both removed their Windows app from the Windows Store and announced they would no longer support it (Callaham 2015; Rubino 2015). When national banks are making decisions to no longer support an app then it is clear there is not much of a future for that OS.

It is clear online and mobile banking will continue to grow in the future. These constantly evolving information systems enable businesses to cut costs by replacing expensive outdated physical infrastructure with digital sites that can be seamlessly updated and maintained from centralized locations. These digital sites can be accessed by users anywhere in the world at any time as long as they have an internet connection. This kind of convenience appeals to today's consumer who demands fast customer responsiveness. But this convenience creates security risks. Corporations have a responsibility to protect their customers and help educate them on ways they can protect themselves.

References

Board of Governors of the Federal Reserve System. "Consumers and Mobile Financial Services 2014." 2014, Mar., http://www.federalreserve.gov/econresdata/consumers-and-mobile-financial-services-report-201403.pdf

Callaham, J. "Chase Bank Now Says Their Windows Phone App Can Be Used 'until Further Notice'" *Windows Central*. Mobile Nations, 2015, Mar. 11, http://www.windowscentral.com/chase-bank-now-says-their-windows-phone-app-can-be-used-until-further-notice

Federal Financial Institutions Examination Council, "About the FFIEC", 2015, Jan. 21, https://www.ffiec.gov/about.htm

Fox, S. *51% of U.S. Adults Bank Online*. Rep. Pew Research Center, 2013, Aug. 7. http://www.pewinternet.org/files/old-media/Files/Reports/2013/PIP_OnlineBanking.pdf

Kelly, S. M., Francheschi-Bicchierai L., Fiegerman S., Strange A., and Wagner K. "The Heartbleed Hit List: The Passwords You Need to Change Right Now." *Mashable*. Mashable Inc., 2014, Apr. 9, http://mashable.com/2014/04/09/heartbleed-bug-websites-affected/

Privacy Rights Clearinghouse, "Chronology of Data Breaches Security Breaches 2005 – Present",2015, https://www.privacyrights.org/data-breach

Rubino, D. "Bank of America Ends Support for Its Windows Phone and Windows Apps." *Windows Central*. Mobile Nations, 2015, Mar. 11, http://www.windowscentral.com/bank-america-ends-support-its-windows-phone-and-windows-81-app

Segar, M. "JPMorgan Data Breach Entry Point Identified: NYT." *Reuters*. Ed. Ken Wills. Thomson Reuters, 2014, Dec. 22, http://www.reuters.com/article/2014/12/23/us-jpmorgan-cybersecurity-idUSKBN0K105R20141223

Sidel, R. "After Years of Growth, Banks Are Pruning Their Branches." *The Wall Street Journal*. Dow Jones & Company, 2013, Mar. 31, http://www.wsj.com/articles/SB10001424127887323699704578326894146325274

Table 1. Bank Branch Closings 2012

Bank Name	Branch Closings
Bank of America	193
PNC	54
RBS Citizens	53
U.S. Bank	44
Wells Fargo	43

Source: Federal Deposit Insurance Corp.

Table 2 Bank Peer Groups Divided by Average Assets

1	AA > $1 billion
2	Between $300 million and $1 billion
3	Between $100 million and $300 million
4	AA < $100 million

Table 3 Question Checklist

Support for Mobile Banking	
A	Provide apps for which OS?
B	Is app free?
Security Information and Measures	
1	Use Secure Socket Layer (SSL)? Or specifically state?
2	Use firewalls?
3	Use security questions?
4	Automatically log off after a period of inactivity?
5	Actively monitor accounts for fraudulent activity?
6	Provide user security tips?
7	Require passwords each time users login?
8	Full account numbers NOT displayed online to the user?

Table 4 Regional Bank Summary

	Yes	Not Stated	% Yes
1. SSL	40	0	100
3. Full Account Numbers	40	0	100
7. Password	40	0	100
2. Security Tips	30	10	75
4. Security Questions	23	17	57.5
5. Firewalls	17	23	42.5
8. Inactivity	17	23	42.5
6. Fraud Monitoring	13	27	32.5

Figure 1 Security Information and Measures by Bank Peer Group

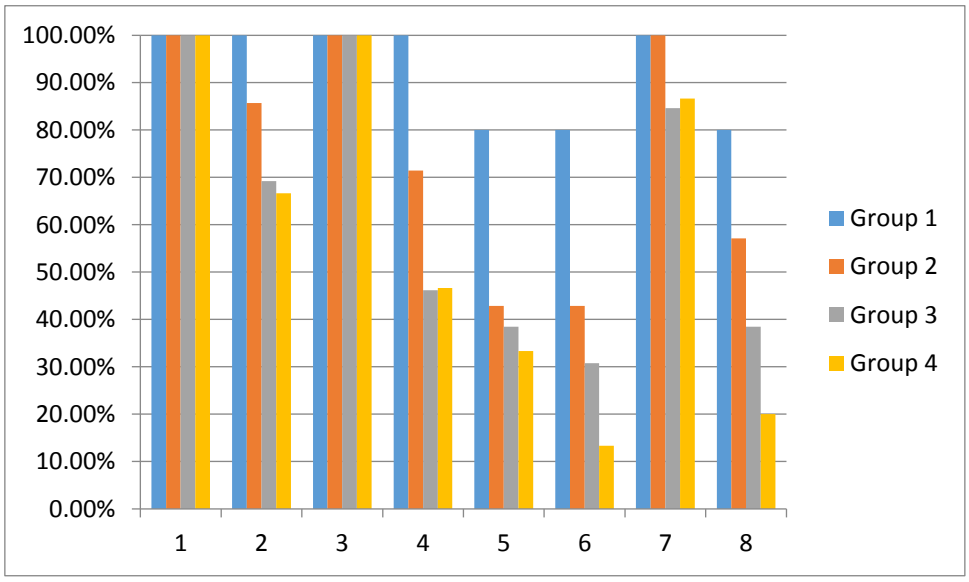
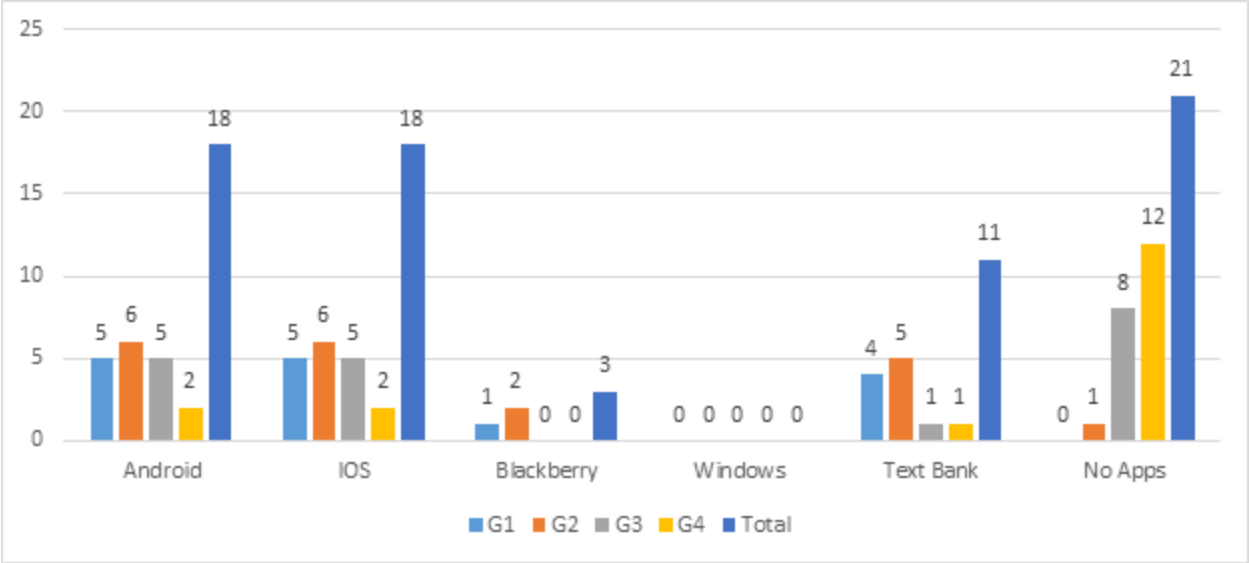


Figure 2 Mobile Apps by Peer Group


25
20
15
10
5
0
5 6 5 2 18
5 6 5 2 18
1 2 0 0 3
0 0 0 0 0
4 5 1 1 11
0 1 8 12 21
Android
IOS
Blackberry
Windows
Text Bank
No Apps
G1 G2 G3 G4 Total

Text Mining for a Common Statistical Error: The Development of a Model

Randy Ryker, Nicholls State University
Chuck Viosca, Nicholls State University

Abstract

Marketing researchers often use exploratory factor analysis (EFA) to develop instruments and theories. Unfortunately, there is evidence that many of these instruments and theories contain superfluous constructs that are not likely to replicate. This is primarily due to marketing researchers using the eigenvalue greater than one rule (EVG1) and/or the scree plot as their factor retention criteria. The best practice is to use either Parallel Analysis or the Minimum Average Partial approach. The actual extent of the problem in the marketing literature is unknown due to the time consuming manual process required to review the thousands of journal articles that have been published over the previous decades. In this paper, we describe the development of a text mining model that can identify articles that used EFA and to further classify these into ones that used the best practices for factor retention, e.g. Parallel Analysis or Minimum Average Partial, and those that did not. Opportunities and challenges of using text mining models to identify common statistical errors are also discussed.

Introduction

Exploratory factor analysis (EFA) is a popular statistical method that is familiar to many researchers, especially those engaged in instrument development and theory construction. Unfortunately, evidence drawn from a sample of three top marketing journals published between 1997 and 2001 indicates that EFA was incorrectly used in a large majority of studies (Patil et al., 2008). Specifically, results revealed that the eigenvalue greater than one (EVG1) rule and the scree plot were the most commonly used factor retention criteria. This practice often leads to the over extraction of factors, i.e., retention of more factors than are justified (Zwich and Veliccr, 1986).

Over extraction of factors is a potentially serious problem for several reasons. First, over extracted factors are meaningless in that they contain no more information than if they were formed by random data (Horn, 1965), and yet researchers use valuable journal space to provide interpretations for them. Second, the publishing of such meaningless interpretations may mislead practitioners into focusing their attention and resources on unnecessary issues (Patil et al., 2010). Third, any subsequent study that attempts to replicate such research is likely to fail to find the same factor structure (Horn, 1965), and this in turn may lead to confusion among those who follow the research stream. Fourth, instruments that contain over extracted factors will also contain a number of superfluous items that measure the factors. Extra items add to the time required to complete an instrument and may contribute to lower completion rates. Finally, over extraction is detrimental to theory development because it spreads item loadings across a larger factor space due to the splitting of factors (Turner 1998; Velicer et al., 2000). Theories based on over extracted factors are thus inefficient and possess less explanatory power.

Prior studies to determine the prevalence of this error in the academic literature involved a manual and labor-intensive process. Thousands of articles had to be read by researchers in order to identify those that contained the problem. Perhaps as a result, only a small set of journals in a few disciplines have been assessed (Patil et al., 2008; Hayton et al., 2004; Fabrigar, 1999; Ryker and Nath, 1997).

The primary objective of this paper is to describe the development of a text mining model that partially automates the identification of this common statistical error. We address the problem by developing a text mining classification model capable of identifying articles that use EFA and their factor retention criteria. Automating the most labor-intensive aspect of such studies will result in an orders-of-magnitude improvement in the efficiency with which they can be conducted. Increased efficiency can facilitate both a more comprehensive understanding of the scope of the problem, as well as more consistent monitoring in the future. Although we focus on marketing journals in this paper, any discipline where EFA is popular may also benefit from using a text mining model of this type.

First, we begin with a brief review of the decisions made in EFA and focus on the factor retention criteria. Next, we describe the development of a text mining model that can identify articles that used EFA and to further classify these into ones that used the best practices for factor retention, e.g. Parallel Analysis (PA) or Minimum Average Partial (MAP), and those that did not use best practices, e.g. EVG1 and scree test. The last section includes a discussion of the opportunities and challenges of using text mining to identify common statistical errors.

EFA Decisions

When conducting EFA, researchers must make three decisions: choice of extraction method, type of rotation, and factor retention criteria. Of these, the decision about factor retention criteria is the most important. It is critical because while there is evidence of robustness across alternatives for the other two decisions, the factor retention criteria often impacts empirical results (Zwick and Velicer, 1986).

Among marketing researchers, the most popular factor retention criteria has been the EVG1 rule followed by the scree plot (Patil et al., 2008). This is problematic because both methods are biased in the direction of over-extraction (Zwich and Velicer, 1986). As noted earlier, over extraction can result in the creation of factors that are both un-interpretable and unlikely to replicate. Under-extraction of factors can also be a problem. However, given the documented popularity of EVG1 rule and/or scree plots which are both biased toward over-extraction, under-extraction is less likely to be a problem in the marketing literature.

Why are the EVG1 rule and scree plot so popular with marketing researchers when other more accurate criteria are available? Three reasons have been suggested (Patil et al., 2008). First, most research on EFA itself, including the recommended use of PA and MAP as the best retention criterion, is published in statistically-oriented journals that are less familiar to many marketing researchers. Second, popular statistical packages (e.g. SPSS and SAS) present the EVG1 rule as the default factor retention criteria but fail to discuss the more accurate methods of PA and MAP.

Third, it appears that many marketing journal editors and reviewers have been unaware of the consequences of using the EVG1 rule and/or scree plot to determine how many factors to retain.

Prior research has found that PA and MAP are the most accurate and least variable of all methods for determining how many factors to retain when conducting EFA (Zwick and Velicer, 1986). As researchers become more familiar with these methods it is likely they will prefer to use PA because, unlike MAP, user-friendly approaches to implement PA are readily available. For example, one freely-available web-based PA program enables researchers to easily conduct PA (Patil et al., 2008). To use the program, researchers are prompted to provide only two pieces of information regarding their dataset to be factor analyzed, the number of items and the sample size (Patil et al., 2008; Patil et al., 2010).

Model Development using CRISP-DM

This section describes the development of a text mining classification model. Guidelines set forth in the CRoss-Industry Standard Process for Data Mining (CRISP-DM) were utilized when constructing the model (Shearer, 2000). Although CRISP-DM was originally designed for use in data mining, it has also been recommended as a best practice for text mining projects (Miner et al., 2012). CRISP-DM organizes the data mining process into six phases: business understanding, data understanding, data preparation, modeling, evaluation, and deployment. The IBM SPSS Modeler Premium software used for this project supports the use of CRISP-DM. The phases of CRISP-DM provide a road map to follow while planning and carrying out a mining project.

Business understanding

This phase of CRISP-DM consists of several steps. We identified three of these steps as most relevant for the current project: specifying the text mining objective, identifying the success criteria for the model, and determining the resources required.

The text mining objective is to develop a text mining model capable of identifying journal articles that use EFA, and to further classify these articles into those which used best practices for factor retention, and those that did not. Specifically the model will:

• Accept as input a list of journal articles and analyze their full text

• Classify articles that used EFA into Category 1

• Further classify these EFA articles into
  - Those that did not use best practices (only EVG1 and/or Scree Test) Category 2
  - Those that did use best practices (Parallel Analysis and/or Multiple Average Partial) Category 3

The success criteria for the project are based on the concepts of precision and recall. Precision is a measure of the accuracy of the model, e.g. in Category 1, the percent of the articles identified by the model as using EFA that actually did use EFA. Recall is a measure of the inclusiveness of the model, e.g. in Category 1, the percent of the EFA articles correctly identified by

the model compared to the total number of EFA articles in the corpus. Calculations for these measures are as follows:

$$\text{precision} = TP/(TP + FP) \qquad \text{recall} = TP/(TP+FN)$$

where TP is true positive, FP is false positive and FN is false negative.

The goal for this project was to achieve at least 80% recall and 80% precision. Although precision was set at 80% we strived for 100% precision for the overall process. To accomplish this we manually reviewed and verified all articles in each category as being correctly classified.

Hardware resources for the project consisted of a standard desktop computer with 4 GB RAM running Windows 7. Other required resources included text mining software and data. The software used was IBM-SPSS Modeler Premium. This is an enterprise-strength data mining tool that has text mining capability. The authors gained access to the software through IBM's Mining in Academia Program.

A corpus of articles that used EFA incorrectly was required to train and test the model. Typically, procuring such a corpus would require reading hundreds of articles and manually selecting those that met the criteria. In this case, the authors of Patil et al., 2008 generously provided us with a list of articles that they had identified as using EFA incorrectly. Articles from their list were used to train and test the model for this project.

Data understanding and data preparation

This phase involves taking a closer look at the data available for mining. After manually examining several articles that used EFA, it was determined that full text articles were required for input. It simply was not sufficient to mine the abstracts or keywords assigned to the articles because the necessary details of using EFA were primarily present in the method and results sections. The data format chosen for full text input was PDF.

During the data preparation phase all articles from the Patil et al. 2008 list were located and downloaded: 35 from the Journal of Marketing, 14 from the Journal of Consumer Research, and 24 from the Journal of Marketing Research, for a total of 73 articles published between 1997 and 2001. The file names of these articles were given a prefix of KP, indicating known positive. All of the 73 KP articles used EFA inefficiently (Patil et al., 2008). That is the factor retention criterion was either EVG1 and/or scree test or was not reported. None of the 73 articles used the best practices of PA or MAP. As a result, all 73 articles were also labeled as KP for not using best practices. To complete the training and testing corpus an additional 430 articles were downloaded. These consisted of all articles that did not use EFA from the same journals and time frame. Their file names were given a prefix of KN, indicating known negative (Table 1).

Table 1: Articles Used for Training and Testing

Journal	Known Positive (KP)	Known Negative (KN)	Total Articles
Journal of Marketing	35	150	185
Journal of Consumer Research	14	134	148
Journal of Marketing Research	24	146	170
Total	73	430	503

These data were divided into training and testing datasets. Approximately one half of the corpus was used for training. We chose the articles from the Journal of Marketing for this purpose. Articles from the Journal of Consumer Research and Journal of Marketing Research were used for testing the model.

Modeling

The IBM SPSS Modeler software uses a variety of algorithms, including Natural Language Processing, to automatically extract features which includes "interesting" words and phrases from the full text of articles (IBM SPSS Modeler User Guide, 2014). The software terminology refers to these features as concepts. Training the model is then an iterative process of:

1. automatically extracting and then selecting useful terms and phrases, collectively referred to as concepts

2. assigning the concepts to a category

3. input training data to the model

4. assessing results to determine the precision and recall

5. examining the false positive and false negative cases to identify areas for model improvement

6. adding or deleting concepts as indicated by step 5.

Steps 3 through 6 are then repeated until acceptable precision and recall are achieved.

To begin we identified relevant terms and phrases for Category 1, i.e. articles that used EFA. A small subset that contained 17 KP articles was used as input and the software was instructed to automatically extract individual terms and phrases collectively referred to as concepts. The results included a list of 5000 concepts sorted in descending order by frequency of occurrence. Being familiar with articles that use EFA we knew numerous concepts to look for. Through a point-and-click interface these concepts were selected and assigned to Category 1.

Next, along with the 17 KP we added 25 KN articles to the input stream and ran the first training session. The model found 19 articles. Of these, 14 were true positives (TP) and 5 were false positives (FP), giving a precision of 74%. It missed 3 papers, false negatives (FN), giving a recall of 82% (Table 2).

Table 2: Training Sessions

Journal	Session	KP	KN	Total	Found	TP	FP	FN	Precision	Recall
JM	1	17	25	42	19	14	5	3	74%	82%
JM	2	18	24	42	18	17	1	1	94%	94%
JM	(final)	36	149	185	35	33	2	3	94%	92%

$$\text{Precision} = TP/(TP + FP) = 14/(14 + 5) = 74\%$$

$$\text{Recall} = TP/(TP + FN) = 14/(14 + 3) = 82\%$$

The false positive and negative cases were analyzed to identify areas for model improvement. Interestingly, one of the false positives was manually confirmed to be a true positive. Researchers, using a manual process in the Patil et al. 2008 study, had missed it. For subsequent runs of the data this article was relabeled with a KP prefix. Other false positives involved the use of confirmatory factor analysis (CFA) only. We considered including a rule to exclude papers with that phrase; however, some studies used both EFA and CFA. We wanted to identify papers that used EFA and those that used both EFA and CFA, but not those that used CFA only. To address this challenge we took what may seem to be a counter intuitive step, we deleted the concept "factor analysis" from the category and relied on other concepts to identify EFA papers. We also analyzed cases that were missed (false negatives) and identified phrases such as "varimax rotation" and "oblique rotation" and these were added as concepts to the category EFA.

For the second training session the same data set was used as input with one exception. Due to the relabeling of one article, there were now 18 KP and 24 KN. This time the model found 18 articles. Of these, 17 were TP and 1 was FP, giving a precision of 94%. It missed 1 paper, a false negative, giving a recall of 94%. To help ensure good performance in the future it is prudent not to over-fit a model to a particular training set (Miner et al., 2012). For this reason no further change was made to the model at this stage.

Next, several training sessions were run with the full training corpus consisting of 36 KP and 149 KN. Each iteration involved evaluation of the false positives and false negatives to identify areas for improvement. Typically there is a trade-off between the recall and precision metrics. Increasing the number of concepts that define EFA will reduce false negatives and thus improve recall. Taken to an extreme, if we included all 5000 concepts in the category EFA then we would expect 100% recall, but precision would be poor. On the other hand, selectively decreasing the number of concepts that define EFA will reduce false positives and thus improve precision. The

objective for this phase of the project was to achieve a balance between precision and recall with at least 80% for each.

The final training run resulted in 35 articles being found. Of these, 33 were TP, and 2 were FP, giving a precision of 94% (Table 2). Three articles were missed, giving a recall of 92%. Again, in the interest of not over-fitting the model to the training data, no further changes were made.

Two tests of the model were conducted, the first using the 14 KP and 134 KN papers from the Journal of Consumer Research (Table 3). Sixteen articles were found. Of these 10 were TP and 6 were FP, giving a precision of 63%. There were 4 FN articles, giving a recall of 71%. A manual examination of the 6 FP papers revealed that 3 of them actually used EFA. These had been missed by researchers in the Patil et al., 2008 study, and should have been labeled KP. The prefix on these three papers was changed from KN to KP and the model was rerun. The new results of this test included 13 TP and 3 FP, giving a precision of 81 %. There were 4 FN papers, giving a recall of 76%.

A second test of the model used articles from the Journal of Marketing Research, including 24 KP and 146 KN. Thirty two articles were found. Of these, 21 were TP and 11 FP, giving a precision of 66%. There were 3 FN papers, giving a recall of 88%. Upon manual review of the 11 FP papers, 3 had been missed by the manual process used by Patil et al., 2008, and should have been identified as TP. We changed the prefix on these papers and reran the model. The new results included 24 TP and 8 FP, giving a precision of 75%. There were 3 FN, giving a recall of 89%.

Table 3: Testing Sessions

Journal	Session	KP	KN	Total	Found	TP	FP	FN	Precision	Recall
JCR	1	14	134	148	16	10	6	4	63%	71%
JCR	1a.	17	131	148	16	13	3	4	81%	76%
JMR	2	24	146	170	32	21	11	3	66%	88%
JMR	2a.	27	143	170	32	24	8	3	75%	89%
JCR+JMR	Totals 1a. + 2a.	44	274	318	48	37	11	7	77%	84%

The combined results for the two tests of the model resulted in 37 TP and 11 FP for a precision of 77%. Seven papers were missed for a recall of 84%. This performance is not as high as the training runs but that is expected in a text mining project (Miner et al., 2012). The model's 77% precision is not particularly a problem because it is recommended that all positive EFA articles be manually reviewed and their factor retention criteria also verified at that time. The manual verification process is facilitated by a point-and-click interface. From a list of positive EFA papers, a user clicks on a link and the full text of the article appears in an adjacent window. The terms and phrases that were employed to identify the article are highlighted in a user specified color. Using this tool it requires only about a minute or two to manually verify the use of EFA and the factor

retention criteria. The 84% recall for the model is sufficiently high to make it useful in determining the scope of the use of EFA and the factor retention criteria for large datasets.

Details of modeling the factor retention criteria for Categories 2 and 3 are not included because it was just an extension of the process used to identify EFA articles, and it was simpler. For Category 2, due to the very unique terms associated with EVG1 and scree plot, a very limited number of concepts were required to classify them. For Category 3, the presence of unique terms also applies to parallel analysis and minimum average partial. Category 3, for PA and MAP, was created, but none of the 503 articles examined used either of these criteria, and that was consistent with the findings of Patil et al., 2008.

Model Evaluation

The model was built using CRISP-DM guidelines and is an effective tool for its designed purpose. The development required many weeks of work; however, once the model was developed it took approximately one hour of computer run-time to process the five years of data from the three marketing journals, i.e. 503 articles. Using the software to guide the process, it took approximately three hours to manually verify the 80 articles identified as using EFA. The efficiency achieved with such a model creates opportunities to assess articles from multiple journals in multiple disciples across decades of time.

The recall performance of the model compares favorably with a manual process. Combining numbers from both the training and test datasets, the model missed 10 papers. Our model revealed that the manual process used by Patil et al. 2008 missed 7 papers, 1 from the Journal of Marketing, and 3 each from the Journal of Consumer Research and the Journal of Marketing Research. A list of the papers missed by the manual process is available from the corresponding author upon request. The precision performance of the model is also acceptable given that all positive papers were manually verified.

After testing the model, the FP and FN articles were assessed to look for clues for future improvement. Several of the FP articles were easy to manually identify because they contained only one EFA concept and that was located in a footnote or a reference only. A few FP articles were actually methodology papers that addressed issues related to EFA but did not use EFA to conduct a study. These too were fairly easy to manually identify. Constructing rules to eliminate these kinds of FP may not be practical.

The primary reason the FN were not found was due to their low signal strength. In other words, even though the article used EFA, perhaps only one clue was present in the paper. The authors may have stated, for example, that data was "factor analyzed" but not discussed any aspect of factor extraction, rotation or factor retention methods, etc. A method to find these papers that have low signal strength without creating more FP could improve the model's recall performance.

Model Deployment

To deploy the model requires access to the full text of marketing articles from the time frame of interest, e.g. 1985-2015. We submitted a data-for-research (DfR) request to JSTOR for a bulk download of articles from the top ten marketing journals. The responsible parties at JSTOR evaluated our request and formally granted us access to the data. The authors, together with a reference librarian at our university, are working with representatives at JSTOR to have the data delivered to us in a suitable format for input into the software model. We expect to report the results of the model deployment in a future study.

Challenges and Opportunities

The initial challenge to using text mining tools for literature mining is acquiring a corpus of articles that contain the patterns a researcher is interested in. This is because doing so, as previously mentioned, is a labor intensive manual process that must be performed by subject-matter experts. We thank fellow researchers for their willingness to share the corpus they manually developed in a previous study (Patil et al., 2008).

As mentioned in the section above, gaining access to the full text of articles in a bulk download can also be a challenge. Although this step is not crucial to the development of the model, it is necessary for deployment of the model.

An opportunity for future research involves the articles identified by the model as having used EFA inefficiently. Each of those articles can then be considered as a potentially new research project. The articles may be sorted in descending order by the number of times they have been cited in other research. Those with the most citations may be viewed as higher priority research opportunities.

Additional testing and validation of the model with another corpus would be helpful. At some point we expect to improve the model's precision and recall performance to where manual validation of results is not necessary.

Finally, this paper proposes a new and partially automated method to detect problems with one common statistical error, the inefficient use of EFA. Additional research opportunities exist to build upon this proposal. Following the same approach as presented here, individual text mining models may be developed to identify other common statistical errors. For a list of common statistical errors see Lang, 2003, and Glantz, 1980.

Conclusions

An earlier conceptual paper described an innovative application of text mining to identify academic articles that have been published with a common statistical error (Ryker and Viosca 2015). This current paper represents a proof of concept of that earlier paper. The tools and major steps performed to accomplish this goal have been described. We also pointed out that a

generalization of this approach may be used to identify other common statistical errors in journal articles.

This study points the way to improving the quality of the journal-based body of knowledge with respect to the inefficient use of EFA. Once the articles with problems are identified, human research work remains to determine to what extent they need to be revised.

One thing is certain: the volume of peer-reviewed research that is published worldwide will continue to grow, in some fields exponentially. Using text mining to partially automate the identification of common statistical errors will help to establish the scope of the problem in the marketing literature as well as in other disciplines. Whenever a new set of best practices are developed for a statistical procedure, it is reasonable to expect there to be a lag of perhaps years before the new practices are uniformly implemented in published research. It takes time for the research community to both disseminate and assimilate the new practices. Text mining models, like the one presented here, may be useful to measure and monitor the presence of common statistical errors in the literature, and thus to gauge the adoption of new practices in academic journals.

References

Fabrigar, L., D. Wegener, R. MacCallum, and E. Strahan. "Evaluating the Use of Exploratory Factor Analysis in Psychological Research" *Psychological Methods*, 1999, Vol. 4, No. 3, 272-299.

Glantz, S. "How to Detect, Correct, and Prevent Errors in the Medical Literature" *Circulation*, 1980, Vol. 61, No. 1, 1-7.

Hayton, J., D. Allen, and V. Scarpello. "Factor Retention Decisions in Exploratory Factor Analysis: A Tutorial on Parallel Analysis" *Organizational Research Methods*, 2004, Vol. 7, No. 2, 191-205.

Horn, J. "A Rationale and Test for the Number of Factors in Factor Analysis" *Psychometrika*, 1965, Vol. 30, 179-185.

IBM SPSS Modeler Text Analytics 15 User's Guide. Accessed from ftp://public.dhe.ibm.com/software/analytics/spss/documentation/modeler/15.0/en/Users_Guide_ For_Text_ Analytics.pdf on February 27, 2014.

Lang, T. "Common Statistical Errors Even You Can Find" *American Medical Writers Association,* 2003, Vol. 18, No. 2, 67-71.

Miner, G., J. Elder, T. Hill, R. Nisbet, D. Delen, and A. Fast. *Practical Text Mining and Statistical Analysis for Non-structured Text Data Applications,* 2012, Waltham, MA: Academic Press of Elsevier.

Patil, V. H., S. N. Singh, S. Mishra, and T. D. Donavan. "Efficient Theory Development and Factor Retention Criteria: Abandon the 'Eigenvalue Greater than One' Criterion" *Journal of Business Research*, 2008, Vol. 61, No. 2, 162-170.

Patil, V. H., M. Q. McPherson, and D. Friesner. "The Use of Exploratory Factor Analysis in Public Health: A Note on Parallel Analysis as a Factor Retention Criterion" *American Journal of Health Promotion*, 2010, Vol. 24, No. 3, 178-181.

Ryker, R. and C. Viosca. "Literature Mining for Common Statistical Errors" *JOBIE*, Spring 2015, Vol. 20, 43-57.

Ryker, R. and R. Nath. "Factor Analysis and the Over-Extraction of Factors: An Empirical Examination" *Proceedings of the Southwest Decision Sciences Institute*, 1997, 130-131.

Shearer, C. "The CRISP-DM Model: The New Blueprint for Data Mining" *Journal of Data Warehousing*, 2000, Vol. 5, No. 4, 13-22.

Turner, N. E. "The Effect of Common Variance and Structure Pattern on Random Data Eigenvalues: Implications for the Accuracy of Parallel Analysis" *Educational and Psychological Measurement*, 1998, Vol. 58, No. 4, 541-568.

Velicer, W., C. A. Eaton, and J. L. Fava. "Construct Explication through Factor or Component Analysis: A Review and Evaluation of Alternative Procedures for Determining the Number of Factors or Components" In Goffin, R. and E. Helmes *Problems and Solutions in Human Assessment: Honoring D. N Jackson at Seventy*, 2000, Boston, MA: Kluwer.

Zwick, W. and W. Velicer. "Comparison of Five Rules for Determining the Number of Components to Retain" *Psychological Bulletin*, 1986, Vol. 99, No. 3, 432-442.

Sherb & Co. LLP: The Master of Botched Audits
A Triple Play of Misconduct

Charles L. Martin, Jr., DBA, CPA, Towson University
Charles J. Russo, PhD, CPA, CMA, CVA, Towson University
Adam M. Eisenstadt, Graduate Student, Towson University

Abstract

This case is an all-time tale of "auditing gone wrong." This actual SEC case is a real-world example of the severe consequences of failing to act with due professional care and proper professional conduct required of certified public accountants. In addition to learning the importance of both ideals, this case will also teach students the highly important concepts of proper supervision, quality control, reviewing, and professional skepticism. Due the international dimension of this case, the case is most appropriate for graduate accounting students. Includes instructor notes and discussion questions.

Keywords: forensic accounting, fraud examination, fraud theory, internal control, ethics, IMA Statement of Ethical Professional Practice

INTRODUCTION

The pinnacle of the auditing profession is the auditor's ability to provide an opinion on the fairness (represented by management's assertions) of the financial statements so that the users of those statements can make important decisions that will not be affected later on because of material misstatements, whether they are due to error or fraud. Accordingly, every organization's goal is to receive an unqualified opinion, meaning that the auditor has no reservations regarding the assertions made by management reflected in the financial statements. In addition, if the auditor is providing integrated audit services, the findings become that much more important as the auditor is also extensively evaluating and communicating the effectiveness of the organization's internal controls, as they "exist as a way to mitigate and manage risk and are necessary for good long-term decision-making" (Gramling, Johnstone, and Rittenberg, 2012, p. 206).

Indeed, expressing the wrong opinion on a client's financial statements is an auditor's worst nightmare. For Sherb & Co. LLP (abbreviated to "Sherb LLP"), a public accounting firm based in the state of New York that has been registered with the Public Company Accounting Oversight Board (PCAOB) since 2003, this nightmare became a reality. Due to improper professional conduct and failure to follow appropriate auditing procedures, the CPA firm was responsible for the failed audits of three Chinese companies from 2007-2011.

From the beginning, the Sherb LLP auditors dug themselves into a hole in which there was no way out. As a result, on November 6, 2013, they were officially fined and charged by the Securities and Exchange Commission for their failed audits and improper professional conduct. The end result: all the individuals involved will no longer be able to practice as CPAs.

THE AUDITORS AND CLIENTS AT HAND

Sherb LLP's failed audits from 2007-2011 were of three Chinese-based clients. Specifically, these were of China One Sky Medical (CKSI) for the year ending 2007; China Education Alliance (also known as "CEU") for the year ending 2010; and Wowjoint Holdings for years ending August 31, 2008 and August 31, 2009, December 31, 2009 (after a change in the ending of the fiscal year), and December 31, 2010 and December 31, 2011 (Securities and Exchange Commission, 2013, p. 3). The principal individuals behind these three botched audits are as follows (p.3):

- Steven J. Sherb, CPA - Managing partner and only equity partner of Sherb & Co., LLP, who was therefore the principal figure of the firm. He served as the concurring partner (reviewer) of both the CKSI and Wowjoint Holdings audits.
- Christopher A. Valleu, CPA - Served as the engagement partner for the audit of CKSI's and Wowjoint Holdings' financial statements; quality review partner of the CEU audit.
- Mark Mycio, CPA – Served as the engagement partner for the audits of CEU and Wowjoint Holdings. In addition, he served the distinguished position of Chair of Financial Accounting Standards of the New York State Society of Certified Public Accountants.
- Steven N. Epstein, CPA – As the senior audit manager for the firm, he served as the manager for the financial statement audits of CEU and Wowjoint Holdings. In addition, he performed key services in connection with the audit of CEU's 2010 year- end financial statements.

WELCOME TO THE CHINESE MARKET

Sherb & Co. unfortunately chose to audit U.S. based stock exchange clients whose headquarters were in China at a very inconvenient and complex time. As Joe McDonald (2012) states, the Chinese market continued to emerge and grow throughout the global recession in 2008, and as such, many investors looked towards the Chinese market for potentially rewarding investments (para. 23). However, over the past few years, the SEC has placed a high level of scrutiny on audits of Chinese companies listed on the U.S. stock exchange due to allegations of accounting fraud and irregularities (para. 9). Many of those under scrutiny are those who are classified as "reverse mergers", in which "investors of the private company acquire a majority of the shares of the public shell company, which is then merged with the purchasing entity," according to Marv Dumon (2009) (para. 2). In addition, he also states how these "relatively simple shell companies can be registered with the SEC on the front end (prior to the deal), making the registration process relatively straightforward and less expensive," which could be a disadvantage for management as they may not be ready to switch to going public and complying with SEC regulations (para. 2, 11). Of the three companies audited by Sherb LLP, CSKI was (and still is) considered a reverse merger.

Due to this level of scrutiny in recent years, many investors have been pulling out of Chinese companies listed on the U.S. stock exchange for fear of what will come next. In addition, as the years went on, fewer and fewer of these Chinese-listed companies went public. To put it in perspective, forty-one Chinese-companies went public in 2010; only twelve in 2011; and then a dismal three in 2012, according to Dena Aubin and Olivia Oran (2013) (para. 8). As time wore on, the SEC became so stringent about transparency that by July 2013, the Chinese government gave into the agency's pressure to release audit work papers from several of the Chinese companies listed on the U.S. stock exchange, according to Amrutha Gayathri (2013) (para. 1). The situation became complex as auditors faced challenges with this protocol due to the strong level of secrecy that exists within the Chinese government overall (para. 2). Making matters even worse, on June 20, 2013, a

Chinese company known as China MediaExpress was charged by the SEC for "fraudulently misleading investors about its financial condition by touting cash balances that were millions of dollars higher than actual amounts," according to the press release (SEC, 2013).

THE CKSI 2007 AUDIT – THE ONSET OF THE STORM

China One Sky Medical is a company headquartered in Harbin, Heilongjiang Province, China and incorporated in the state of Nevada, according to the investigation (SEC, 2013, para. 8). It traded on the NASDAQ Global Market under the ticker symbol "CSKI" from September 14, 2008 to February 15, 2012; however, it now trades on the OTC (Over The Counter) market in which no exchange floor is actually present (para. 8). As part of the pharmaceutical industry, it is "engaged in the development, manufacture, marketing and sale of over-the-counter, nutritional supplements and over-the-counter plant and herb-based pharmaceutical and medicinal products" (Reuters, 2013, para. 1). As of December 31, 2010, it sold 120 products, which were all classified into the categories of "Ointments, Patches, Sprays, Drops, Suppositories, Diagnostic Kits and others," (para. 2).

At the onset of this audit, Sherb & Co. already had a trail of evidence showing its complete disregard for due diligence, professionalism, adequate supervision, and the crucial stage of planning. Generally accepted auditing standards (GAAS) define the planning stage as "developing an overall audit strategy for the expected conduct, organization, and staffing of the audit…Obtaining an understanding of the entity and its environment, including its internal control, is an essential part of planning and performing an audit in accordance with generally accepted auditing standards," (AU 311.02). Effective planning is needed in order to determine how much, and what type of, evidence will need to be gathered and to determine the amount of necessary testing.

Engagement partners Valleau and Epstein did not undertake an understanding of the nature of CSKI's business. The partners were unaware that the company was technically classified as a reverse merger, and therefore was under scrutiny by the SEC at the time. According to the SEC press release on Sherb LLP, the only work undertaken by Valleau and Epstein involved "partially filling out a few forms with generic checklists" (SEC, 2013, para. 19). Such limited procedures severely affect the outcome of the audit as the partners completely overlooked a well established deceptive fraud. Essentially, during fiscal year 2007, CSKI reported to the SEC that it had entered into an agreement with a Malaysian distributor who would distribute exported sales of 'slim' patches to Malaysia by two sales agents, known as customers "A" and "B", to whom the goods were originally sold by CSKI. Through this agreement, CSKI purported that its sales revenue from the slim patches increased from $1.2 million in 2006 to $12.3 million in 2007, with sales accounting for 25% of CSKI's total revenue in during 2007 (para. 13-14).

In actuality, the purported sales revenue from the slim patches turned out to be entirely fraudulent upon a SEC investigation completed in September of 2012. The investigation revealed that CSKI never actually entered into a distribution agreement with the Malaysian distributor, nor did customers "A" and "B" actually exist (SEC, 2012, para. 2, 5). This alarming information could have been discovered had the Sherb LLP auditors performed an audit in accordance with GAAS. According to the investigation, because Valleau and Epstein never actually examined the supposed agreement, they were unaware that there was no mention of any such customers (SEC, 2013, para. 19). No action was taken by Sherb LLP to consider what the risk of material misstatement would be due to fraud. As a result, no plan was set in place to identify where fraud could be potentially concealed (para. 21).

In addition to granting an unqualified opinion based on $12.2 million of fraudulent sales for the 2007 audit, numerous other problems existed. One of these major problems was that there was no supervision of the Hong Kong auditors who were contracted to perform the actual field work, which included testing of CSKI's sales revenue. As GAAS dictates, substantive testing requires that the auditor have "adequate technical training and proficiency to perform the audit" (AU 210.01). Therefore, it was Sherb LLP's intent to send out a senior auditor who was fluent in Chinese to discuss with the contract auditors their background to determine if they were qualified to perform the audit. However, no documentation exists that this ever occurred, and as a result, the contract auditors' workpapers contained many errors and were also incomplete. Still, Valleau and Epstein signed off on them despite knowing full-well of the overwhelming errors (p. 7).

Due to this lack of supervision, the contract auditors also made several other major mistakes that were undoubtedly 'red flags' with regards to the integrity of CSKI's management. The first major red flag was during the testing of the sales invoices to identify whether Value-Added-Tax (VAT) was properly assessed. Chinese law dictates that a VAT must be assessed on all imported sales and refunded on all exported sales made. However, upon testing, it was soon realized that VAT sales invoices were never prepared for the sales made to customers "A" and B." After inquiring of CSKI management as to why the customers never received any VAT assessments, the contract auditors were told that it was because these customers never requested any sales invoices. In actuality, A and B would have been entitled to $2 million worth of VAT refunds, which contradicts the statement that they would have no desire to request a sales invoice. Both Valleau and Epstein accepted this explanation despite this obvious red flag (para. 28-29).

The other major red flag dealt with the procedures the contract auditors applied towards CSKI's documenting the delivery of the goods and its bank statements. The contract auditors neglected to realize that the documents supporting the delivery of the goods gave no shipping address or the name of the customer and they also failed to determine whether the deposits shown on the bank statements were actually related to those sales made to customers A and B. As an example, some of the sales were recorded 20 days prior to the date of the actual purchase. Despite these clear signs of utilizing the fake customers for fraudulent revenue, both partners signed off on the related workpapers (para. 30-31)

As for Steven Sherb, serving as the concurring partner (in charge of reviewing the workpapers), he did not exercise due diligence in the audit. He never conducted in full-depth review of the workpapers. He merely signed off on a couple of checklists. He never retained the workpapers relating to the planning and assessment of risk of material misstatement. He, or anyone else in the firm, never communicated with CSKI's predecessor auditor before or after accepting the company as a client. All of these circumstances culminated in Sherb, LLP rendering an unsupported unqualified opinion (pgs. 9-10).

ANOTHER FAILURE – THE 2010 CEU AUDIT

One would think that a failed audit in the past would mean that the firm would immediately correct its past mistakes as soon as possible in order to prevent 'botched' audits in the future. For Sherb LLP, the picture only became more and more dismal with the audit of China Education Alliance's (known as CEU) financial statements for the 2010 year-ending, in which an unqualified report was included with CEU's 10-k released on April 15, 2011.

China Education Alliance is a "leading educational service company offering high-quality online education materials and on-site training and tutoring to families, provincial education

officials, administrators, schools and teachers in China," (China Education Alliance, 2013). It is a North Carolina based-corporation with headquarters in Harbin, China and was listed on the NYSE from January 27, 2010 to December 28, 2011; however, it now trades on the OTC market (SEC, 2013, para. 42).

Mark Mycio of Sherb, LLP served as the lead engagement partner for CEU's audit. His audit was doomed from the start when he decided that it would be suitable to photocopy a risk assessment form completed for a prior-year audit of CEU. In doing so, he allegedly "changed several dates, crossed out the name of the prior engagement partner, and inserted his own name," (para. 51). No risk assessment interviews were conducted with CEU management and, even though a summary was included among the workpapers, it only contained Mycio's initials.

During 2010, CEU reported that a majority of its operations were completed through cash and that many of its cash deposits were located at various banks. During 2010, CEU also came under fire from public allegations that the company's operations were fraudulent. The investment advising firm Kerrisdale Capital made claims that the CEU was a hoax; the website did not function; the physical location was merely an empty building; and most importantly, the financial statements were fraudulent ("China Education Alliance", 2010, p. 1). These allegations alone would necessitate Mycio and his engagement team would have to associate a high audit risk with CEU, especially in the audit of cash.

Sherb LLP's attempts to gather evidence in support of the cash account proved to be futile. In March of 2011, a staff auditor sent to Harbin, China was unable to gather the bank statements from the banks despite being told that they could be printed for a small fee. In the following month, Sherb LLP's partner Epstein decided to take matters into his own hand when he tried to gather the bank statements by personally meeting with CEU's management. At the first bank, he was handed bank statements by a CEU employee who purported that they were real even though Mycio never actually saw any bank official procure them. At the second bank he visited, a purported bank teller handed him bank statements but never actually provided her name. A bank official also visited him but would neither give her business card nor would she authenticate the bank statements (para. 53-55).

Sherb, LLP auditors also had difficulty in gathering evidence supporting CEU's training centers (where the revenue was generated) and the company's overall fixed assets. Contrary to normal audit practice, CEU management chose which training centers the staff auditors could visit in order to examine the student records. Upon the staff auditors' visit, the CEU manager would not allow them to examine the records by asserting that they had to be kept confidential. In addition, a staff auditor reported that the managers "hastily exited from that training center with the Sherb LLP staff auditors" which led the auditor to conclude the possibility of the center never being associated with CEU. Despite these strange encounters, Mycio still thought nothing of it. Epstein also made a visit to the centers as well, but again CEU dictated which centers he would visit. Epstein did not perform any substantive testing during his visit (para. 56). Upon these visits, one of the staff auditors reported that one of the CEU managers tried to bribe him to directly influence the 2010 audit. Mycio never followed-up on the attempted bribery.

As for CEU's fixed assets, management reported that they increased by 51% from year-end 2009 to year-end 2010. With such a significant increase, one would expect significant testing to prove the validity behind this assertion. However, Mycio never performed any physical inspection or analytical procedures (para. 57).

Similar to the complete disregard seen with the CSKI audit, the CEU audit workpapers were never retained and an unqualified opinion was given despite the numerous irregularities and problems.

Valleau, who was the CEU engagement partner for the 2008 CEU audit, now served as the partner in charge of the quality review for this current CEU engagement. According to PCAOB No. 7, paragraph 8, "the person who served as the engagement partner during either of the two audits preceding the audit subject to the engagement quality review may not be the engagement quality reviewer." Sherb LLP did not correct this impropriety. Valleau did not investigate the bribery charge; the fraud assessment workpapers only contained his signature while all other area were incomplete or merely copied from the prior year's workpapers. (para. 65, 68-69).

THIRD TIME'S A CHARM - OR NOT

The final botched audits of Wowjoint Holdings, Inc. wrapped up the perfect storm of failures that entangled Sherb LLP so deeply. Similar to CSKI and CEU, Wowjoint is a U.S.-based company with an operating subsidiary in China; specifically, it is based in the Cayman Islands and its subsidiary in China is located in Beijing (para. 70). The subsidiary, known as Beijing Wowjoint, is "involved in customized heavy duty lifting and carrying machinery for heavy and bulky loads used in such large scale infrastructure projects as railway, highway, bridge construction and so on," ("Introduction", 2013, para. 1). According to the investigation, Wowjoint was traded on the NASDAQ exchange in 2010 under the listings of "BWOWF" and "BWOWU", but like CSKI and CEU, became delisted in 2011 and later listed OTC (para. 70).

Wowjoint audits were for the years-ending August 31, 2008 and 2009, the four-month transition at December 31, 2009 due to the change in fiscal year, and December 31, 2010 and 2011. Valleau was the engagement partner for the audits from 2008-2010. As with the other audits, he did not properly plan for the Wowjoint audits nor did he actually gain an understanding of the nature of the business. The majority of the audit-related work was assigned to Epstein, who not only reviewed the workpapers but also communicated with Wowjoint and its SEC counsel (para. 72). Epstein was unable to gain a full understanding of Wowjoint's use of the percentage-of-completion (POC) method dealing with the use of heavy machinery, which is needed to properly recognize revenue from the contracts overseeing construction-related work. Although a staff auditor assigned to the engagement had experience with the POC method, his expertise of the subject only dealt with Taiwan entities and not those of the U.S. (para. 73).

Due to the engagement team's failure to familiarize themselves with the POC method and understanding how each part of the formula needs to be assessed in order to determine proper revenue recognition, Valleau and Epstein were unable to determine whether the purported revenue from the contracts was correct or not. As a result, they could not reconcile the projected costs, which were based on the accrual method, and therefore could not calculate the true Cost of Goods Sold expense for Wowjoint. This failure to determine the true amounts and then accepting them as given led them to improperly render an unqualified opinion on the audits for August 31, 2008 and 2009. In addition, no adjustments were made to CEU's reported increase in net income from $3.9 million in 2008 to $9.8 million in 2009 (para. 77-78).

After August 31, 2009, Wowjoint changed its fiscal year so that the year-ending date would now be on December 31 after it issued an F-1 to the SEC. This meant that Sherb LLP would provide an audit for those four months leading up to December 31, 2009. Alarming and shocking news came to Epstein when he discovered that the company had somehow suffered a net loss of $6 million in a matter of only four months (or a net decrease of $15.8 million). Epstein soon realized

that it was due to a very large adjusting journal entry that is known as a "topside" entry, in which the entry, as authorized by senior management, is manually entered into the books (para. 80). The entry was measured at RMB (the Chinese currency) at 43 million, which was material in nature and was done to record the "lost" COGS that were never recognized in prior years.

Upon inquiring with Wowjoint's controller – the culprit behind this large journal entry – it was explained that Wowjoint had been using the cash-basis accounting method the entire time, resulting in liabilities that were never accrued. This immediately explained why such a large topside entry during the transition to the new fiscal year-end was needed. However, U.S. GAAP dictates that only accrual-basis accounting may be used. Valleau and Epstein took no further action at all and seemingly passed on the amounts with another unqualified opinion for the transitional period (p. 19-20).

In addition to misstated revenue and income for these three audits, there were significant problems with the audit of accounts receivable. During all three audits, accounts receivable accounted for the majority of Wowjoint's current assets, with a large portion of them showing accounts that were delinquent for more than one year. A delinquency of this magnitude is undoubtedly risky since it shows that the company is failing to collect any payments on time.

Surprisingly, Epstein made the effort to inquire with management as to why these delinquencies had persisted for so long and was told that these Chinese government based entities were always slow in making payments. Again, he simply accepted this explanation and did not question management. As it turns out, the receivables were from a private entity that was a co-party contractor with Wowjoint and the payment structure presented by management was unlike any normal payment structure. There was no examination as to whether the accounts receivable was fairly stated. In addition, the staff auditors never provided any follow-up examination to these receivables in the following fiscal year and the workpapers related to testing of accounts receivable were left blank (p. 21-22).

Since most of the workpapers were written in Chinese, Epstein could not provide any sort of review. He decided to sign off on these workpapers as provided (para. 90, 93). As has been the pattern, the workpapers for these past three audits were also not retained.

By the time the final audits of 2010 and 2011 had approached, due professional care was non-existent. Both audits were completely deficient to the point that they were undertaken recklessly. In the 2010 audit, Mycio was originally assigned as the engagement partner yet only spent one week at the Wowjoint location before immediately traveling back to the U.S. without considering who would supervise the staff auditors. According to the SEC investigation, the only work he performed was "audit planning and answer[ing] some technical question." The investigation also revealed that Valleau then took over at some point, yet he claims that this never happened other than providing support on a few workpapers (p. 24).

During the 2011 audit, Mycio returned as the engagement partner, yet similar to the prior year audits, he accepted the revenue computations as they were. He essentially allowed Wowjoint to use accelerated revenue recognition techniques whereby revenue was being recognized for projects that were not yet completed. The workpapers were never retained. In addition, Sherb himself was assigned as the quality control reviewer and concurring review partner for both the 2010 and 2011 audits. However, no evidence was gathered that he actually reviewed prior year workpapers (other than completing a few general checklists). Sherb never realized that the initial client acceptance form clearly detailed that Wowjoint's financial reporting system had appeared to be "insufficient to provide evidence to support that transactions have occurred…" He rendered unqualified opinions for both the 2010 and 2011 audits (p. 25-27).

EPILOGUE

As a result of the lead partners' complete disregard for due professional care, supervision, quality control, and professional conduct overall, they received the same sentence from the SEC: they are no longer allowed to practice as Certified Public Accountants. In addition, the firm itself can no longer practice as a provider of public accounting services and will be required to pay a fine of $75,000. Sherb, Mycio, and Valleau must wait five years before reappearing before the commission to practice as accountants and preparers or reviewers. Epstein has been ordered to wait a maximum of three years before doing so.

INSTRUCTOR NOTES

This case is an all-time tale of "auditing gone wrong." This case is a real-world example of the severe consequences of failing to act with due professional care and proper professional conduct required of certified public accountants. In addition to learning the importance of both ideals, this case will also teach students the highly important concepts of proper supervision, quality control, reviewing, and professional skepticism. Due the international dimension of this case, the case is most appropriate for graduate accounting students. The discussion questions and responses follow.

Discussion Questions and Suggested Solutions

1. **At the forefront of the many issues at hand with this case was complete lack of due professional care. Describe what this means and summarize the key areas as to how they so violated this area.**

In relation to the AICPA's Statements on Auditing Standards, the term *due professional care* is an overarching concept that is explored in great detail in AU 230. The third general auditing standard states that "the auditor must exercise due professional care in the performance of the audit and the preparation of the report," (para. 1) and expands upon this whereby it states that an auditor "should possess the degree of skill commonly possessed" by other auditors and should exercise it with "reasonable care and diligence"' (para. 5). More importantly, in the context of this case, it also states that "the auditor with final responsibility for the engagement should know, at a minimum, the relevant professional accounting and auditing standards and should be knowledgeable about the client" (para. 6).

All of the lead auditors never fully demonstrated due professional care throughout the audits of CSKI, CEU, and Wowjoint Holdings. In all three, each of the lead auditors never developed an adequate understanding of the client at hand in order to determine the exact degree of substantive testing necessary to lower the audit risk enough to prevent from issuing an inappropriate opinion. In addition, poor planning also meant that there was no identification as to which financial statement accounts would be at risk for material misstatements, whether due to error or fraud. The most prominent example was Valleau and Epstein's failure to adequately examine the distribution agreement and customers "A" and "B". If this had been done, they could have more readily detected the CSKI fraud. Another example was Epstein's failure to understand how the Percentage-Of-Completion (POC) method is applied to U.S. construction projects. If he had done so, he would have realized how grossly overstated CEU's revenue was during the course of the audit.

Due professional care requires *professional skepticism* at all times, which AU 230.07 defines as "an attitude that includes a questioning mind and a critical assessment of audit evidence." In the audit of all three companies, professional skepticism was not applied. In many situations involving the partners, be it communicating with management or examining audit evidence, they did not use their knowledge to fully question the validity of the information. The lack of effort to adhere to GAAS is what drove them to accept almost every piece of information handed over to them.

Due professional care within the planning phase also includes proper supervision. AU 311 provides the framework for planning and supervision, and in paragraph 28, it lists the following elements that constitute as what supervision entails: "instructing assistants, keeping informed of significant issues encountered, reviewing the work performed, and dealing with differences of opinion among firm personnel." By following this standard during the audit of CSKI, both Valleau and Epstein should have thoroughly inspected the fieldwork by the contract auditors to prevent the numerous errors in the workpapers. In addition, since the partners involved never reviewed any workpapers, there was no way to be assured if the staff members actually were capable of performing the necessary audit procedures.

2. **In the audit of CEU during 2010, a staff auditor encountered the situation of where he was reportedly bribed by a CEU manager in order to directly influence the outcome of it. How should auditors handle situations of illegal acts?**

Indeed, while the bribe was not identified as actually creating any impact on the fairness of CEU's financial statements, it was still unprofessional for Mycio to simply act as if it had never happened.

AU 317.02 defines illegal acts as the following: "...violations of laws or governmental regulations. Illegal acts by clients are acts attributable to the entity whose financial statements are under audit or acts by management or employees acting on behalf of the entity." Then in paragraph seven it further adds the following: "If specific information comes to the auditor's attention that provides evidence concerning the existence of possible illegal acts that could have a material indirect effect on the financial statements, the auditor should apply audit procedures specifically directed to ascertaining whether an illegal act has occurred."

Based on these facts, the bribe reported to Mycio should have been taken seriously since CEU management could have possibly gathered inside audit information in order to conceal other findings that Mycio would have discovered in an attempt to sway the financial statements to their desire. Although Mycio would still render an unqualified opinion based on his past actions, the point still lies in the fact that an act such as a bribe points to the sheer impact on the integrity of management. As CEU was already coming under fire for possible allegations of fraud, this reported illegal act should have forced Mycio into immediate action by seeking out CEU's legal counsel, which could have led to an actual fraud that was ongoing (the seeking of a legal counsel is suggested in paragraph 10, part a).

As paragraph 17 states, Mycio should have learned the name of the manager from the staff auditor so that he could have sought assistance from other senior management after they were informed. If it came to light that senior management, as a whole, were also involved with the corruption detected by the staff auditor, then the last resort would have been for him to seek assistance from the governing body, i.e. the Board of Directors.

3. A major reason for the Wowjoint Holdings audit going drastically wrong was the inaccuracy of its large accounts receivable balances. Set forth the audit procedures for accounts receivable and explain the course of action that Epstein should have taken.

Since the accounts receivable balance constituted the majority of Wowjoint's current assets, special attention was warranted and the audit procedures for accounts receivable needed to be carefully followed. According to Gramling, Johnstone, and Rittenberg (2012), the following audit procedures should be performed for accounts receivable (p. 411):

- "Foot the individual accounts making up the total of accounts receivable"
- "Age the accounts"
- "Select individual items for further audit tests"
- "Print confirmations" (and therefore sending them out to selected customers)
- "Statistically evaluate the results"
- "Make a judgment on the need for an audit adjustment"

As these were most likely the steps that the staff auditors performed that led them to identify the largest accounts receivable balance, such as the private co-party affiliated with Wowjoints, the other step that Epstein so crucially missed was not seeking the use of confirmations. This would have been a much more productive measure for him to take since it was evident that management acted as if a delinquency for a year or more was not concerning. A positive confirmation would have been sent out to the private co-party as well as all other large delinquent accounts, since a positive confirmation request the recipients to "review the current balance or unpaid invoice(s) due to the client and return the letters directly to the auditor indicating whether or not they agree with the balance," (p. 546). This could have possibly led to the realization that some of the customers might have been less delinquent or more delinquent than Wowjoint reported. In general, confirmations represent a higher level of documentary evidence and provide appropriate safeguards against the possibility that management was lying to Epstein all along.

4. During the audit of Wowjoint's revenue account, the percentage-of-completion method was used to determine the amount of revenue recognized from each contract. Identify and explain the procedures an auditor uses in the audit of accounting estimates. What should have Epstein took into factor if he actually planned for the audit?

AU 342, *Auditing Accounting Estimates,* provides the detailed framework for auditors evaluation of revenue estimates derived through the percentage-of-completion method. AU 342 defines accounting estimates as "an approximation of a financial statement element, item, or account," which usually include one of the following (paragraph 1):

- "The measurement of some amounts or the valuation of some accounts is uncertain, pending the outcome of future events."
- "Relevant data concerning events that have already occurred cannot be accumulated on a timely, cost-effective basis."

Three key means to asserting the reasonableness of management estimates found in paragraph 10:

- "Review and test the process used by management to develop the estimate."
- "Develop an independent expectation of the estimate to corroborate the reasonableness of management's estimate."
- "Review subsequent events or transactions occurring prior to the date of the auditor's report."

Had Epstein and Valleau spent additional time to adequately understand the percentage-of-completion (POC) and then applied that knowledge with the steps given above on evaluating the reasonableness of the estimate, the realization that these contracts were not properly accounting for costs and revenues would have come to light much sooner. Since they only took the estimates provided by management at 'face-value', the behind-the-scenes work in developing the estimates were never fully understood. In addition, as paragraph 11 suggests, Epstein and Valleau could have utilized a specialist who has expertise in construction industry to advise them how revenue recognition should be handled. In this manner, the specialist could have explained the POC method to them as well as advising them on what the actual estimates *should* have been.

5. One of the most important tasks a partner of a public accounting firm has is to establish an effective quality control system. Describe what constitutes a successful quality control program and identify what was missing in the Sherb & Co. LLP audits.

QC 10, or *A Firm's System of Quality Control*¸ provides the overarching outline for what a firm must do in order to have an effective quality control system in place. According to paragraph 17, the following elements are needed to achieve appropriate quality control:

- "Leadership responsibilities for quality within the firm (tone at the top)"
- "Relevant ethical requirements"
- "Acceptance and continuance of client relationships and specific engagements"
- "Human resources"
- "Engagement performance"
- "Monitoring"

Thus, when examining this list, it becomes quite clear how much Sherb LLP was lacking for an effective quality control system; which, if properly instilled, the partners of the firm might have corrected the numerous control issues present. Leadership responsibilities were not clear; for instance, during the Wowjoint audit, Valleau was not informed that he was assigned to replace Mycio as the engagement partner. With the next category, ethical conduct was not taken seriously, with the most prominent example being that Mycio sought to take no action upon hearing the purported situation of bribery during the CEU audit. Procedures for the acceptance and continuation of client relationships were not in place as evidenced by the partners never communicated with the former auditors prior to the CSKI engagement. Human resources could have been much more effective at the firm if they hired auditors who were familiar with the Chinese environment and the language; especially since the workpapers were written entirely in Chinese. Finally, as for engagement performance, the audit firm did not follow GAAS since the workpapers were not properly reviewed and appropriate supervision was lacking. If the partners instilled a proper monitoring system, many of these botched audits could have been turned around with many of the misstatements being detected and corrected much sooner.

References

American Institute of Certified Public Accountants. (2013). AU 210. Retrieved December 5, 2013 from http://www.aicpa.org/Research/Standards/AuditAttest/Downloadable Documents/AU-00210.pdf

American Institute of Certified Public Accountants. (2013). AU 230. Retrieved December 11, 2013 from http://www.aicpa.org/Research/Standards/AuditAttest/Downloadable Documents/ AU-00230.pdf

American Institute of Certified Public Accountants. (2013). AU 311. Retrieved December 5, 2013 from http://www.aicpa.org/Research/Standards/AuditAttest/Downloadable Documents/ AU-00311.pdf

American Institute of Certified Public Accountants. (2013). AU 317. Retrieved December 11, 2013 from http://www.aicpa.org/Research/Standards/AuditAttest/Downloadable Documents/ AU-00317.pdf

American Institute of Certified Public Accountants. (2013). AU 342. Retrieved December 11, 2013 from http://www.aicpa.org/Research/Standards/AuditAttest/Downloadable Documents/ AU-00342.pdf

American Institute of Certified Public Accountants. (2013). QC section 10: A firm's system of quality control. Retrieved December 11, 2013 from http://www.aicpa.org/Research/ tandards/AuditAttest/DownloadableDocuments/QC-00010.pd

Atkins, Matt. (2011). Accounting fraud in U.S. – listed Chinese companies. *Financier Worldwide.* Retrieved December 5, 2013 from http://www.financierworldwide.com/ article.php?id=8480

Aubin, Dena and Oran, Olivia. (2013). Chinese companies retreat from U.S. listings as scrutiny mounts. *Reuters*. Retrieved December 5, 2013 from http://www.reuters.com/article/2013/ 01/14/us-china-accounting-idUSBRE90D11P20130114

China Education Alliance. (2013). About CEU. *China Education Alliance*. Retrieved December 10, 2013 from http://www.chinaeducationalliance.com/

Dumon, Marv. (2009). Reverse mergers: The pros and cons. *Investopedia.* Retrieved February 3, 2014 from http://www.investopedia.com/articles/stocks/09/introduction-reverse-mergers.asp

Gramling, A., Johnstone, M. & Rittenberg, L. (2012). Auditing: a business risk approach. Mason, OH: South-Western Cengage Learning.

Gayathri, Amrutha. (2013). China agrees to allow SEC access to audit papers of Chinese companies trading in US. *International Business Times*. Retrieved December 5, 2013 from http://www.ibtimes.com/china-agrees-allow-sec-access-audit-papers-chinese-companies-trading-us-1343345

Kerrisdale Capital. (2010). China Education Alliance (CEU). *Kerrisdalecap.com.* Retrieved December 10, 2013 from http://kerrisdalecap.com/wp-content/uploads/2010/11/CEU-Report-November-2010.pdf

McDonald, Joe. (2012). Chinese companies pull out of US stock markets. *Yahoo! Finance.* Retrieved December 5, 2013 from http://finance.yahoo.com/news/chinese-companies-pull-us-stock-095649722.html

Public Company Accounting Oversight Board. (2013). Auditing standard no. 7: Engagement quality review. Retrieved December 10, 2013 from http://pcaobus.org/Standards /Auditing/Pages/Auditing_Standard_7.aspx

U.S. Securities and Exchange Commission. (2013. Sherb & co., llp, et al (SEC release no. 34 - 70823. Retrieved from http://www.sec.gov/litigation/admin/2013/34-70823.pdf

U.S. Securities and Exchange Commission. (2013). SEC charges China-based company and CEO in latest cross-border working group case [Press release]. Retrieved from http://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171605909#.UqksdOL82MU

Wowjoint Holdings, Inc. (2013). Introduction. *Wowjoint Holdings.* Retrieved from http://www.wowjoint.com/

Structuring Executive Compensation Contracts: The Impact of Industry Technological Intensity

Joshua Aaron, Middle Tennessee State University
Shanan Gibson, East Carolina University
William McDowell, Middle Tennessee State University
Michael Harris, East Carolina University
Mark Jobe, Middle Tennessee State University

Abstract

This study examines the relationship between CEO compensation packages and firm performance. We suggest the optimal compensation contract is partially dependent on the CEO's industry type, specifically low-tech or high-tech industries. Our results indicate that firms in high-tech industries perform better with greater proportions of incentive-based compensation while firms in low-tech industries perform better when offering greater proportions of guaranteed pay. These findings suggest firms should their industry environment as well as the characteristics and preferences of their CEOs prior to designing the compensation package.

Introduction

Extant research suggests many factors influence the compensation of CEOs. Industry-level factors or external environmental factors have been found to influence CEO pay structure. Such factors influence both the amount and type of compensation firms offer CEOs. Milkovich (1982) indicated regulatory changes often cause significant alterations to a firm's compensation policies. Stroh et al (1996) found top managers in higher turbulence industries receive a higher proportion of variable compensation. Chu et al (2006) suggest the stage of industry life cycle is important. Specifically, businesses operating in early or rapidly changing stages of the industry life cycle will use more contingent compensation. Balkin and Gomez-Mejia (1987) find that high-tech companies in the United States tend to link more compensation to firm performance than non-high-tech companies, citing a pioneering culture and rapid development as causes.
The above factors highlighted in other research are said to influence the amount and/or type of compensation. In this study, we seek to determine the varying impact of incentive-based compensation for CEOs in high-tech industries versus CEOs in low-tech industries. These are relevant factors because the CEOs themselves have self-selected into an industry that is either dynamic (high-tech) or static (low-tech) in nature. As such, those CEOs have given us some information regarding the extent to which they personally value risk and uncertainty with a large upside potential or they prefer a less risky, more certain and stable environment. It is logical to assume those preferences will manifest themselves in the optimal compensation packages for those CEOs as well.

Hypothesis Development

Firms in high-technology industries usually exhibit highly volatile returns (Liu, 2006; Ciccone & Rocco, 2005). High-tech firms tend toward incentive-based compensation due to a variety of reasons. First, firms that operate in high-technology industries face a significant survival risk due to constantly changing technical standards and legal requirements (Horng et al., 2006). The firm cannot guarantee a large amount of compensation because the board simply does not know if the cash will be available or if the firm will survive.

Second, actions of the top executives can be expected to have a more significant impact on firm performance when volatility is high (Chu et al., 2006). Thus, these firms can adequately compensate quality CEO's by using a higher percentage of contingent compensation. As with small firms, the contingent compensation insulates the firm to some degree against the ebbs in firm returns. Chu et al. (2006) find that in large Taiwanese firms, technological intensity of the external environment is the best predictor of the use of incentive compensation.

Third, the volatility inherent in high-tech industries make high-tech firms riskier than firms operating in industries characterized by lower technological intensiveness (Chu et al., 2006). Thus, firms in high-tech industries would be assumed to attract more risk tolerant CEOs who accept, and are motivated by, the risk inherent in their industry along with risk inherent in their own compensation package.

Therefore, firms operating in high-technology industries should benefit more from making incentive-based compensation a higher proportion of the CEO's pay than those in low-technology industries. We present the following hypotheses:

Hypothesis 1: Firms in low-tech industries will perform better when offering their CEOs a greater proportion of fixed compensation relative to incentive based compensation.

Hypothesis 2: Firms in high-tech industries will perform better when offering their CEOs a greater proportion of incentive based compensation relative to fixed compensation.

Methodology

We utilize a two-step methodology to test the impact of industry on the compensation package-firm performance relationship. The first step is to split the CEO dataset (containing 24,000 observations) into firms operating in high and low tech industries in order to run the association study to determine the pattern of the data. For each group, we sort the data by the focal variable (Percent Perf Comp) to create quintiles. For example, LOW TECH Q1 represents the smallest proportion of Perf Comp in the low-tech firms while HIGH TECH Q1 represents the smallest proportion of Perf Comp for the high-tech firms.

Measures and Analysis

Hypotheses are tested on 24,000 CEO observations from ExecuComp covering 1992-2004. Incentive pay was operationalized as the percent of performance-based compensation (i.e., Black-Scholes option value plus the value of the restricted stock grants.) relative to the overall

compensation (i.e., includes performance-based compensation plus salary and bonus) for the CEO. Performance was measured as the CRSP equally weighted mean cumulative abnormal return and the buy and hold equally weighted mean cumulative abnormal return. Both models were accessed using the EVENTUS software to conduct an association study that ties the firms in the quintiles to the quintile-wide performance as measured by the two models. The use of the CRSP model to estimate abnormal performance allowed us to handle multiple and overlapping option grants for CEOs, aggregating them to one date. The fiscal year end for a firm served as the focal date because we did not have the option grant date and some CEOs have several grant dates in one year. We used mean cumulative abnormal returns to examine the performance around that date. Cumulative abnormal returns are the returns for a specific firm for one year, two years, etc. following the event over and above the return for the market as a whole. Thus, we have implicitly controlled for market returns and fluctuations.

Results & Discussion

In order to test Hypothesis 1, the observations were divided into low-tech and high-tech industries by SIC code to create two separate datasets. The low-tech dataset contains 16,260 (67.3%) observations. Next, the observations in the each dataset were sorted on the focal variable (% incentive compensation) and then divided into five equal segments. Quintile 1 represents the bottom 20% of firms in terms of the percentage of incentive-based compensation they offer and quintile 5 represents the top 20% of firms. Each quintile in the low-tech dataset contains 3,252 observations. Then, the association study was performed in EVENTUS to match the firms in each quintile with their abnormal return. The results are displayed in Table 1 below.

Table 1 – CEOs in Low Tech Industries

	1 year	**2 year**	**3 year**	**4 year**	**5 year**
Q1	-0.09	1.30	2.74	2.94	2.42
Q2	1.32	2.13	2.36	2.43	1.86
Q3	1.32	1.55	-0.23	-0.74	-0.14
Q4	-2.45	-1.93	-2.43	-5.00	-8.59
Q5	-2.68	-7.98	-10.95	-11.66	-13.42

Hypothesis 1 asserted that firms in low-tech industries would perform better when offering their CEOs more guaranteed pay than incentive-based pay. Table 1 shows the peak (best performance) for the CEOs with the lowest amount of incentive-based compensation (Q1 & Q2). Additionally, the worst performance is for the firms offering CEOs the highest amount of incentive-based compensation (Q5). These results lend support to Hypothesis 1 and the assertion that firms in low-tech industries should use more guaranteed pay relative to incentive-based pay in their compensation structure.

In order to test Hypothesis 2, the high-tech firms were examined. The high-tech dataset contains 7,910 (32.7%) observations. Those observations were sorted on the focal variable (% incentive compensation) and then divided into five equal segments. Quintile 1 represents the bottom 20% of firms in terms of the percentage of incentive-based compensation they offer and quintile 5 represents the top 20% of firms. Each quintile in the high-tech dataset has 1,582 observations. Then, the association study was performed in EVENTUS to match the firms in each quintile with their abnormal return. The results are displayed in Table 2 below.

Table 2 – CEOs in High Tech Industries

	1 year	**2 year**	**3 year**	**4 year**	**5 year**
Q1	5.07	6.38	9.33	11.04	13.16
Q2	3.42	8.23	11.26	14.10	13.35
Q3	3.14	6.39	5.97	8.47	11.04
Q4	8.06	11.65	11.31	12.47	14.14
Q5	6.06	6.39	4.43	1.41	-2.11

Hypothesis 2 asserted that firms in high-tech industries would perform better when offering their CEOs more incentive-based pay than guaranteed pay. Table 2 shows the peak (best performance) for the CEOs generally occurs in Q4. This means CEOs in high-tech firms generally perform optimally when offered relatively high amounts of incentive-based compensation. Hypothesis 2 is partially supported. It is not fully supported due to the dip in performance in Q5 suggesting the relationship is not linear. The results of Table 2 suggest firms in high-tech industries should use more incentive-based pay than their low-tech counterparts, but there is an inflection point, beyond which offering additional incentive-based pay produces detrimental results. In other words, firms in high-tech industries should use a moderate amount of incentive-based pay as a percentage of total compensation for their CEOs.

Implications

There are many managerial implications from this study. The first is simply not to assume that more incentive-based compensation is necessarily better (agency theory). The results cited above show that firms in high-tech industries are performing better when given higher proportions of incentive-based compensation to their CEOs while firms in low-tech industries perform best when given a relatively small percentage of incentive-based compensation to their CEOs. Additionally, we see incentive-based compensation is a more influential variable for CEOs in high-tech industries than for CEOs in low-tech industries. This makes it all the more important for high-tech firms to incentivize with substantial performance-based compensation, but also understand that *too-much-of-a-good-thing* can be bad (Pierce & Aquinis, 2011).

As a result, compensation committees should realize that CEOs respond differently to different compensation packages. The entire purpose of stock options and other incentive-based

compensation is to properly align individual interests with firm interests. Individual risk-preferences will play an instrumental role in proper alignment. Firms should evaluate the risk-preferences of their CEOs prior to designing the compensation package. CEOs in high-tech industries are likely attracted to those jobs because they are willing to take on more risk. It is not surprising that they thrive when given a compensation package that is riskier in nature but provides more upside potential.

References

Aaron, J., Harris, M., McDowell, W. and B. Cline. "Optimal CEO incentive contracts: A prospect theory explanation" *Journal of Business Strategies*, 2014, Vol. 31, Iss. 2, 336-356.

Aupperle, K. E., Figler, R. A. and R.C. Lutz. "Do The In Search Of Excellence Firms Effectively Match CEO Compensation To Corporate Performance?" *Journal of Managerial Issues*, 1991, Vol. 3, Iss. 4, 444-445.

Balkin, D. and L. Gomez-Mejia. "Toward a contingency theory of compensation strategy" *Strategic Management Journal*, 1987, Vol 8, 169-182.

Ciccone, S. and T. Rocco. "The tech industry or regulated industry: Which one the true glamour stocks?" *Journal of Financial Service Professionals*, 2005, Vol. 59, 64-74.

Chu, C., Hu, H. and N. Chu. "A framework for interpreting the antecedents of CEO compensation: An organizational adaptation perspective" *The Journal of American Academy of Business*, 2006, Vol. 8, 235-241.

Crumley, C. R. "A Study of the Relationship Between Firm Performance and CEO Compensation in the U.S. Commercial Banking Industry" *Journal of Applied Management & Entrepreneurship*, 2008, Vol. 13, Iss. 2, 26-45.

Fama, E. F. "Agency Problems and the Theory of the Firm" *Journal of Political Economy*, 1980, Vol. 88, Iss. 2, 288-307.

Horng, M., Chang, Y. and Y. Lin. "Legal liability risk for enterprise R&D: The case of high tech industry in Taiwan" *Journal of American Academy of Business*, 2006, Vol. 9, 99-104.

Finkelstein, S. and D.C. Hambrick. "Top-Management-Team Tenure and Organizational Outcomes: The Moderating Role of Managerial Discretion" *Administrative Science Quarterly,* 1990, Vol. 35, Iss. 3, 484-503.

Jensen, M. and W. Meckling. "Theory of the firm: Managerial behavior, agency costs and ownership structure" *Journal of Financial Economics*, 1976, Vol. 3, Iss. 4, 305-360.

Jensen, M. C. and K.J. Murphy. "Performance Pay and Top-Management Incentives" *Journal of Political Economy*, 1990, Vol. 98, Iss. 2, 225-264.

Liu, Q. "How good is good news? Technology-depth, book-to-market ratio, and innovative events" *Journal of Accounting, Auditing & Finance*, 2006, Vol. 21, 293-321.

Mehran, H. "Executive compensation structure, ownership, and firm performance" *Journal of Financial Economics,* 1995, Vol. 38, Iss. 2, 163-184.

Milkovich, G. "EEO policies and research: Symposium introduction" *Industrial Relations*, 1982, Vol. 21, 273-276.

Murthy, K. and M.S. Salter. "Should CEO pay be linked to results?" *Harvard Business Review*, 1975, Vol. 53, Iss. 3, 66-73.

Pappas, J. M. and K.E. Flaherty. "The moderating role of individual-difference variables in compensation research" *Journal of Managerial Psychology,* 2006, Vol. 1, 19-35.

Pierce, J.R., and H. Aguinis. "The too-much-of-a-good-thing effect in management" *Journal of Management*, 2011, Vol. 39, Iss. 2, 313-338.

Stroh, L., Brett, J., Baumann, J., and A. Reilly. "Agency theory and variable pay compensation strategies" *Academy of Management Journal*, 1996, Vol. 39, 751-767.

Sundaramurth, C. Rhoades, D.L. and P.L. Rechner. "A Meta-analysis of the Effects of Executives and Institutional Ownership on Firm Performance" *Journal of Managerial Issues*, 2005, Vol. 17, Iss. 4, 494-510

Veliyath, R., and J.W. Bishop. "Relationship between CEO Compensation and Firm Performance Empirical Evidence of Labor Market Norms" *International Journal Of Organizational* Analysis, 1995, Vol. 3, 268-283.

Wright, P., Ferris, S., Sarin, A., and V. Awasthi. "Impact of corporate insider, blockholder, and institutional equity ownership on firm risk-taking" *Academy of Management Journal*, 1996, Vol. 39, 441-458.

The Use of Social Media in Small and Medium-sized Enterprises

Marsha Carson, University of Central Arkansas
Lauren Maxwell, University of Central Arkansas
Laci Lyons, University of Central Arkansas
Andree Roy, Universite de Moncton, Canada

ABSTRACT

The use of social media has increased dramatically in the past few years. This paper investigates why small and medium-sized enterprises (SMEs) use social media, how they evaluate their performance in reaching customers, and which social media platforms they used. Four SMEs (8 to 110 employees) in Central Arkansas were interviewed about their use and evaluation of social media. Results indicate that these SMEs use social media because it can be implemented with a limited budget and sustained through existing platforms where information can be transferred free of charge. The SMEs use social media to inform current and potential customers about products, services, and special events. Participating enterprises reported that social media is a cost-effective tool to reach customers and to generate sales. The success of social media is only limited by employee's time and expertise.

INTRODUCTION

According to the U.S. Small Business Administration (SBA, 2013), a small business is independently owned and operated, is organized for profit and can be defined either by the average number of employees (fewer than 500 employees) or the sales volume. By contrast, Mittelstaedt, Harben and Ward (2003) and Wolf and Pett, (2000), used the North American research definition that a small enterprise has 20 to 99 employees, whereas a medium-sized one has 100 to 499.

In 2010, the 27.8 million SMEs represented 99.7% of all employers and employs 49.1% of the private-labor force in the USA. Thus, they are crucial to the fiscal condition of the country, (SBA, 2013a). The 241,455 SMEs in Arkansas also had a significant impact state's economy in 2010. They represented 96.8 % of all employers and employ 50.0% of the private-sector labor force (SBA, 2013b).

For its part, the American Council for Technology (2011) defines social media as the collaborative use of technology to integrate social interaction and to create new content. This interaction gives more control to the consumer. "Traditional media communicates with their target market and their environment indiscriminately whereas social media is fully customizable at the individual level focusing on the individual needs, and businesses control the information they disseminate. This unique ability of social media to communicate information in a rapid and timely manner is transforming the way small businesses interact with the people." Studies by Oracle (2012) and Milano, Baggio, and Piattelli (2011) note that the boundaries of authority and control are becoming less clear. These definitions emphasize the facts that social media integrate social interaction in order to create content. For example, Blackshaw and Nazzaro (2004) define social media as customer generated media, which includes new sources of online information that is created, initiated, circulated and used by customers who educate each other about a wide range of

issues. The American Council for Technology and Industry Advisory Council (2011) defines social media as the collaborative use of technology to integrate social interaction and to create new content. This interaction gives more control to the consumer. However, the boundaries of authority (Milano, Baggio, and Piattelli, 2011) and control (Oracle, 2012; Milano, Baggio, and Piattelli, 2011) are becoming less clear because of consumer input.

Perception of social media and its use…finding it is a necessity to use various forms of social media to make information available (Travel and Tour World, 2013). This is confirmed by Taneja, Toombs (2014) who noted that social media has changed the delivery, structure and availability to reach current and future customers and others. Small business leaders are using social media marketing to promote their business to gain visibility, viability and sustainability to survive in the current competitive era.

There is a large number of social media. In his study, Belvaux (2011) identifies 51 different social media. However, according to reports from Hubspot (Blake, 2010) and Nielsen (Dec. 3, 2012), the four most popular social media platforms are LinkedIn, Twitter, YouTube, and Facebook. In a recent study from National Small Business Association for 2013, McCarthy (2014) cited the top 4 social media platforms as LinkedIn, Facebook, Twitter, and Google+ with YouTube just below. The top 4 are also supported by Taneja and Toombs (2014) as cited in their findings were Facebook, LinkedIn, Twitter, and Bing. The use of these four most popular social media can also be linked to various industries. As noted in the Hubspot report (year), social media is commonly linked to the following industries:

- LinkedIn: consulting, biotech, pharmaceutical, manufacturing, advertising, banking, and publishing;
- Twitter: oil, spas, insurance, hotel, lawyers, and fashion;
- YouTube: video games, music, and healthcare;
- Facebook: cell phones, movies, restaurants, and travel.

In a more recent report written for the Social Media Marketing Industry, Stelzner (2013) identifies Facebook and LinkedIn as the two most important social networks. In a relatively short period of time, Facebook has become, according to Milano, Baggio, and Piattelli (2011) and Stelzner (2013), the largest (in numbers of users) and the most widespread (in geographical terms) online social network in the world.

Some interesting statistics noted by Campbell (April 8, 2010) concerning social media include:

- If you have 100 Twitter followers or more, you're in the top 7% of Twitter users.
- If you post at least one Twitter update a day, you're among the top 15% most active users.
- If your Facebook has more than 100 fans, you are in the top 65%.
- The number 1 measurement of business-to-business is how much traffic is sent to their website.

Additional sources listed the following interesting facts about social media:

- 24% of SMEs have integrated social media (Beesley, 2013);
- 50% of the U.S. population is on Facebook, while 37% have a U.S. passport (The marketing bit, 2013);
- A company that is significantly smaller than its competitors can outmaneuver the "Big Boys" on social media (The marketing bit, 2013);

- 92% trust recommendations from friends, while 47% trust paid TV, magazine, and newspaper ads (Regos, 2012);
- Word-of-mouth referrals affect new customer acquisitions and have longer carryover than traditional forms of marketing--21 days versus 3-7 days. (Trusov, Bucklin, & Pauweis, 2009);
- Word-of-mouth referrals on social media site affect positively new customer acquisitions and can be linked to the number of new members subsequently joining the site (sign-ups) (Trusov, Bucklin, & Pauweis, 2009);
- 17% of businesses surveyed said that they used location-based platforms while 97% reported other social channels like Facebook (Sweeney, 2013);
- SMEs have realized that using social media has become the best way to reach current and potential customers (Exabyzness, April 13, 2013).

However, other research indicates that some businesses encounter problems when they want to use social media, even if they see it as a positive and useful tool for their business. Mielach (2013) in a Fox News report and Beesley (2013), a Community Moderator for the Small Business Administration (SBA), observed some common excuses and reasons why small businesses minimally used social media:

- "I don't know."
- "I'm too busy."
- "I don't know which social media site is right for my business."
- "I tried it but it didn't work."
- "I don't have enough updates to keep my site looking active."

Lee and Wicks (2010) give other reasons. Businesses are not familiar with Internet-based technologies and have not had sufficient opportunities to learn about and evaluate these dynamically changing technologies. The lack of funds to implement these new technologies was also indicated as a great constraint.

METHODOLOGY

The four SMEs included in the study are located in the state of Arkansas in the USA. Their selection was based on the following criteria:

- Determined to be sufficiently successful with a minimum of eight years in business),
- Representative in terms of type and size industry for theoretical generalization purposes. These hospitality and tourism-related SMEs represent various sectors, such as: restaurants, retail, bakeries, and festivals.

The methodology used for this article includes a census of the literature on social media combined with a qualitative and exploratory research approach, i.e. multiple case studies giving the present state of knowledge on social media in SMEs. The literature census more specifically covers social media and its pros and cons. The case study method is well adapted in situations where theoretical propositions are few and field experience is still limited (Yin, 1994). A multiple-site case study allows one to understand the particular context and evolution of each firm with regard to the use of social media.

Data was collected through semi-structured tape-recorded one and a half hour interviews with the owner-manager or the manager of the SMEs responsible for social media. Interview

transcripts were then coded and analyzed following Miles and Huberman's (1994) prescriptions with the assistance of the Atlas.ti application. For reasons of confidentiality, fictitious names of individuals and firms participating in the study were used. For example, the first business interviewed is represented by the letter A and a name starting with the letter A (Albert). The second business interviewed is represented by the letter B and a name starting with a B (Beatrix) and so on. As presented in the research results section, these firms range in size from 8 to 110 employees. See Table 1. Of these businesses, 50% were doing business worldwide and the other 50% were doing business mainly in the state of Arkansas.

Table 1: Profiles of SMEs

Demographics	SMEs			
	A	B	C	D
Size --Numbers of Employees	110	24	8	8
Business Ownership --Incorporated	Yes	Yes	No	Yes
Industry --Hospitality &Tourism	Restaurant	Restaurant	Tourism Store	Festival
Geographic Market	Arkansas State	Arkansas State	Worldwide	Worldwide
Marketing Department	Informal	Informal	Informal	Informal
Budget --Marketing --Social Media	 Formal Formal	 Formal Formal	 Informal Informal	 Formal Informal

The study results show that the SMEs surveyed have a fair understanding of what social media is, but they use social media minimally which is consistent with the Beesley (2013) study, and Facebook (see Table 2) is the prominent social media used, which is consistent with results found by Blake (2010), Nielsen (2012) and Sweeney (2013). The study also confirms results found in the Hubspot report (Blake, 2010), i.e. restaurant and travel industries tend to use Facebook as their social media platform. In Table 3, the reasons SMEs use social media are indicated.

Table 2: Social Media Used by SMEs

Social Media	SMEs			
	A	B	C	D
Facebook	x	x	x	x
Twitter		x		x
LinkedIn Mobile				
Blog		x		
Hootsuite				x
Flickr		x		x
Foursquare		x		
Gowalla				
Tweetdeck				
Others (QBOT, Instagram)		x		x
Web Site (web page)	x	x	x	

Table 3: Reasons to Use Social Media

Social Media	SMEs			
	A	B	C	D
Inform Current Customers	x	x	x	x
Educate Current Customers				
Inform Potential Customers	x	x	x	x
Educate Potential Customers				
Inform Employees		x		
Educate Employees				

When participants were asked "how they evaluate their performance in the use of social media either to reach current customers or to attract new customers", the businesses were not able to evaluate their results. For example in Table 4, Albert comments, "That's such a hard thing to quantify. I would give us a "C"... You know, I'd give us a "C" on both of them. It would be hard to quantify." Beatrix says something similar, "Not sure, but possibly a "C"… 5,000 Facebook followers; I feel it's very effective such as a Valentine's Day promotion." Dora tells us, "I think we do really well reaching our existing customers, just when you go through, you can read 3 Tweets for example. I know that in Facebook I can keep a close eye on how many Likes we have. I don't know if it's us attracting the new or if it's just being out there. Part of social media just lends itself to attracting new things on its own."

Table 4: Participant Responses

Question	**How would you evaluate your performance in the use of social media either to reach current customers or to attract new customers?**
Company	Response
A	That's such a hard thing to quantify. I would give us a "C"... You know, I'd give us a "C" on both of them. It would be hard to quantify.
B	Not sure, but possibly a "C"… 5,000 Facebook followers; I feel it's very effective such as a Valentine's Day promotion.
D	I think we do really well reaching our existing customers, just when you go through, you can read 3 Tweets for example. I know that in Facebook I can keep a close eye on how many Likes we have. I don't know if it's us attracting the new or if it's just being out there. Part of social media just lends itself to attracting new things on its own.

Although the growth of visitors on a social site can be monitored and compared to existing members at a precise date (Oracle, 2012; Trusov, Bucklin and Pauwels, 2009), none of the businesses interviewed were making use of that available data. None of them use the analytical tool in Facebook to monitor their success in reaching customers, either current or potential. Only one business is using Hootsuite, a tool to enhance the social media management of different platforms. In order to explain how they evaluate their performance in their use of different social media, Dora tells us, "We kind of stick with the basic Facebook, Twitter, Flickr and Hootsuite so that we don't get spread too thin." This seems to confirm what Stelzner (2013) found in his report, that only about 25% of businesses are measuring their social activities.

CONCLUSION

The study indicates that social media in SMEs is influenced by ease of use, affordability, and availability of time to implement or the availability of technical support. Facebook and company websites, the most common platforms, were used to implement promotional programs for customers. Research also shows that SMEs use the most common social media platforms because they are familiar and are the easiest to use to inform and educate the greatest number of customers.

The social media behaviors exhibited by the SMEs are supported in the literature. They use social media because it can be implemented and sustained with a limited budget and can use existing communication channels where the transfer of information among persons is free of charge. Obtaining information or evaluation of products or services from other consumers is perceived as more trustworthy because the comments are not from employees of the company.

Each of the SMEs noted that their social media strategies could be more successful if they devoted more time to researching and implementing them. Some of these methods include obtaining the number of followers on Facebook, the number of Tweets, Hootsuite and increased sales. None of them used analytical tools for evaluation.

In the future, the most successful will be those who encourage customers to participate in designing products and services they consume.

REFERENCES

American Council for Technology and Industry Advisory Council. (March 2011). "Best Practices Study of Social Media Records Policies." Available online: http://www.actgov.org/knowledgebank/whitepapers/Documents/Shared%20Interest%20Groups/Collaboration%20and%20Transformation%20SIG/Best%20Practices%20of%20Social%20Media%20Records%20Policies%20-%20CT%20SIG%20-%2003-31-11%20(3).pdf

Beesley, C. (January 3, 2013). "Don't Be a Social Media Marketing Skeptic – Learn Where and How to Start." Available online: http://www.sba.gov/community/blogs/community-blogs/small-business-matters/don%E2%80%99t-be-social-media-marketing-skeptic-%E2%80%93-lea

Belvaux, B. (2011). "The Development of Social Media: Proposal for a Diffusion Model Incorporating Network Externalities in a Competitive Environment." *Research and Applications in Marketing.* 26(3), 7-22.

Blackshaw, P. and Nazzaro, M. (Spring, 2004). "Consumer-generated Media (CGM) 101: Word-of-mouth in the Age of the Web-fortified Consumer." *Intelliseek* white paper. 1-15.

Blake, A. (Sept. 1, 2010). Free ebook: "Understanding Blog, Social Media and Search Engine Usage by Industry." Available online: http://blog.hubspot.com/blog/tabid/6307/bid/6495/Free-Ebook-Understanding-Blog-Social-Media-and-Search-Engine-Usage-by-Industry.aspx

Campbell, A. (April 8, 2010). "10 Social Media Benchmark Statistics: How Are You Doing?" *Small Biz Trends*. Available online: http://www.sba.gov/community/blogs/guest-blogs/industry-word/10-social-media-benchmark-statistics-how-are-you-doing

Exabyzness & Fox Business. (April 13, 2013). "Small Businesses Doubling Down on Social Media Efforts." Available online: http://www.exabyzness.com/technology-and-trends/small-businesses-doubling-down-social-media-efforts/

Lee, B. C. and Wicks, B. (2010). "Tourism Technology Training for Destination Marketing Organisations (DMos): Need-based Content Development." *Journal of Hospitality, Leisure, Sport & Tourism Education.* 9(1), 4-12.

Mielach, D. (May 8, 2013). "Small Business Favors, Social Media, Over-location Marketing." Available online: http://smallbusiness.foxbusiness.com/marketing-sales/2013/05/08/small-business-favors-social-media-over-location-marketing/#

Milano, R., Baggio, R., and Piattelli, R. (2011). "The Effects of Online Social Media on Tourism Websites." 18th International Conference on Information Technology and Travel and Tourism, Innsbruck, Austria. Available online: http://www.iby.it/turismo/papers/baggio_socialmedia.pdf

Mittelstaedt, J.D., Harben, G.N. and Ward, W.A. (2003). "How Small is Too Small? Firm Size as a Barrier to Exporting from the United States." *Journal of Small Business Management.* 41(1), 68-84.

National Small Business Association. (March 2014). "Social Media is Important for Small Business Owners." http://www.statista.com/chart/2025/small-business-owners-and-social-media/

Nielsen Newswire. (December 3, 2012). "Social Media Report 2012: Social Media Comes of Age." Available online: http://www.nielsen.com/us/en/newswire/2012/social-media-report-2012-social-media-comes-of-age.html

Oracle. (2012). "Best Practices for Getting Started with Social Media." Available online: http://www.oracle.com/us/media1/best-practices-for-social-media-wp-1588491.pdf

Regos, M. (July 5, 2012). "The Impact of Social Media on Travel and Tourism – Infographic. Out and About Marketing." Available online: http://www.outandaboutmarketing.com/2012/07/the-impact-of-social-media-on-traveltourism/

SBA (2013a). (February 2013). "Small Business Profiles: United States. Advocacy - The Voice of Small Business in Government." United States.

SBA (2013b). (February 2013). "Small Business Profiles: Arkansas. Advocacy - The Voice of Small Business in Government." United States.

Sorokina, O. (2014). "Daily 18-minute Social Plan for Small Businesses." http://blog.hootsuite.com/social-media-plan-for-small-businesses/

Stelnzer, M. (2013). "2013 Social Media Marketing Industry Report: How Marketers Are Using Social Media to Grow their Businesses." *Social Media Examiner*. Available online: SocialMediaExaminer.com.

Sweeney, D. (May 9, 2013). "Why Location-based Social Marketing is Slowly Dying." *Social Media Today.* Available online: http://socialmediatoday.com/deborah-sweeney/1450301/why-location-based-social-marketing-slowly-dying

Taneja, S. and Toombs, L. (2014). "Putting a Face on Small Businesses: Visibility, Viability, and Sustainability the Impact of Social Media on Small Business Marketing." 18(1), 249-260.

The Marketing Bit. (Retrieved May 2, 2013). "Impacts of Social Media on Tourism." Available online: http://www.themarketingbit.com/marketing-lessons/social-media-tourism/#more-2003

Travel and Tour World. (April 17, 2013). "Impact of Social Media on the Tourism Industry." Available online: http://www.travelandtourworld.com/news/article/impact-of-social-media-on-tourism-industry/

Trusov, M., Bucklin, R. E., and Pauwels, K. (2009). "Effects of Word-of-mouth Versus Traditional Marketing: Findings from an Internet Social Networking Site." *Journal of Marketing.* 73, 90-102.

Yin, R.K. (1994). Case study research: Design and methods, 2nd edition. Thousand Oaks, California: Sage Publications.

The 150-Hour Requirement: Dust Keeps Settling—Questions Keep Lingering

Thomas W. De Berry, PhD, CPA, CFE, Freed-Hardeman University
Amy T. Vandenberg, St. Norbert College

Abstract

In August 2003, *The CPA Journal* published "The 150-Hour Requirement and CPA Quality," with the sidebar on the title page of "Time to evaluate effectiveness." With modifications in 150-hour requirements having already been enacted in some states in the years since then, and with more being discussed, perhaps it is "time to (again) evaluate effectiveness." In follow-up research, over 6,000 Wisconsin CPAs were asked very similar questions regarding the 150-hour requirement and CPA quality as Georgia CPAs had been in the earlier research. This paper reports the results of that research with Wisconsin CPAs and compares to that with Georgia CPAs from several years ago.

Introduction

With significant time having passed in many states since their 150-hour requirement was implemented, allowing the dust to settle, questions about perceived costs and benefits of the requirement persist. One article published in *The CPA Journal* August 2003, "The 150-Hour Requirement and CPA Quality, with the sidebar title "Time to Evaluate Effectiveness," noted that the objective of the 150-hour requirement, according to the AICPA, is to "improve the overall quality of work performed by CPAs confronted with advancing technology, an increasingly complex business environment, and society's continuing demand for accounting and assurance services" (De Berry, 2003). This article explored the question of "Is it working?"

Define "working."

There have been a variety of alleged results of the 150-hour requirement. For that matter, there have been a variety of versions of "the 150-hour requirement," and those versions have sometimes changed from a requirement that candidates complete 150 semester hours of college education to take the CPA exam to something else. Changes in performance of such candidates with the CPA exam have been researched and reported, as have changes in the numbers of candidates taking the exam after their states implemented their version of the 150-hour requirement. However, less has been researched about other accomplishments of the requirement—accomplishments that are less easily quantified but which were perhaps most significant in its promotion when the 150-hour movement was gaining steam.

Literature Review

One example of research into these other accomplishments is the August 2003 article referenced above (De Berry, 2003). In it, the author reported on research with Georgia CPAs conducted in 2001 when the requirement enacted in that state in 1998 was still relatively fresh in their minds. This research found that those CPAs perceived that estimated annual starting salaries for CPA-ready hires had increased nearly $4,000 in real terms (not due to inflation or issues of supply and demand) since the implementation of the 150-hour requirement. However, the perception of those respondents was that these new hires had improved only modestly, if at all, in 15 qualitative measures.

The impact of the 150-hour requirement on the quality of CPA exam candidates as employees and the real cost of the requirement to their employers continues to be pondered by the profession. A sidebar title with the August 2003 article was "Time to evaluate effectiveness." With modifications having already occurred in some states and discussions of further modifications and even repealing their 150-hour requirement occurring in some states, perhaps it is "time to (again) evaluate effectiveness."

Research Study

In an effort to accomplish such re-evaluation, over 6,000 CPAs in the state of Wisconsin were surveyed in 2009 regarding their perceptions about changes in the capabilities of new staff accountants eligible to take the CPA exam—comparing those hired prior to the 150-hour requirement to those hired after its implementation. This survey also inquired about respondents' perceptions of changes in real starting salaries since the requirement's implementation (not salary changes due to inflation or supply-and-demand forces). Respondents remained anonymous and submitted answers electronically. This study of the perceptions of Wisconsin CPAs regarding these topics was intentionally very similar to that conducted in late 2001 with Georgia CPAs, and is somewhat of a follow-up study to that one. With more time having passed since the implementation of the 150-hour requirement and with CPAs from a different state and region of the country being surveyed, this study expands the knowledge gained by the earlier-published study.

Research Results

Similarities in Study Results

Not only was the Wisconsin study's design intentionally very similar to that done earlier with Georgia CPAs, but many aspects of the results with the two studies were also very similar. Even such aspects as the response rate and the demographic data from survey respondents were surprisingly similar. With the Wisconsin study surveying over twice as many as did the Georgia study, the net response rate was nevertheless nearly identical—about 5%—with about 300 usable responses in the Wisconsin study. (The actual number varied by question—between 290 and 308.) Exhibit 1 summarizes work sector and firm size demographic data for survey respondents for the two studies. Respondents in the two studies were almost identically divided among work sectors, and were similar in classifications of firm size—with respondents in the Wisconsin study being somewhat more from relatively large (501-5,000 employees) firms.

Differences in Study Results

Differences in results from the two studies do exist; the most striking of these is in regard to estimates of change in starting salaries. The two groups of CPAs disagreed in regard to whether the implementation of the 150-hour requirement had caused (apart from supply and demand results) any change in real (taking out the effects of inflation) starting salaries. Most Georgia respondents (82.4%) believed that real starting salaries had increased since the implementation of the 150-hour requirement, and they estimated that increase to be an average of nearly $4,000. Among Wisconsin respondents, 242 respondents (83.4 %) indicated that they believed salaries have stayed about the same following implementation of the 150-hour requirement—given supply and demand and inflation. This study also asked Wisconsin CPAs, "Given your previous answer, approximately how much (in dollars) have annual salaries increased or decreased as a result of implementation of the 150 hour requirement?" The average dollar response to this question from those 39 respondents who estimated increases in salaries was over $6,000. When one outlier amount ($50,000) was taken from the responses from those Wisconsin CPAs who estimated increases in real starting salaries, the average estimated increase dropped to $5,500. These results should be interpreted to mean that 83.4% of Wisconsin respondents believed that real starting salaries had stayed about the same following the 150-requirement's implementation, but that among those who believed to the contrary, the estimated change was an increase of about $6,000.

Wisconsin CPAs were also asked to rate changes in quality of new CPA-ready hires after implementation of the 150-hour requirement, as compared to the quality of those before the requirement. The Wisconsin study used an almost identical list of qualitative measures of capabilities of staff accountants to that the Georgia study used. However, the Wisconsin study used a tighter, simpler rating scale. Georgia CPAs in 2001 rated new hires in these 15 qualitative measures on a scale of -50 to +50. The Wisconsin study used the simpler range of 1 to 5—with 1 indicating that new hires are much weaker than previous hires, 5 indicating that new hires are much stronger than previous hires, and 3 indicating no difference in new hires.

Georgia CPAs rated new hires following the 150-hour requirement's implementation to be very slightly stronger in 14 of the 15 qualitative measures and slightly weaker in the remaining one (commitment to the employer). Exhibit 2 summarizes the results of these ratings of change in quality by Wisconsin CPAs. For each qualitative characteristic, percentage ratings are for those respondents who provided an answer for the item (ranging from 290 respondents to 295 respondents).

Analysis of Change in Quality Results

While Georgia CPAs in 2001 rated new hires as stronger than those new hires before the 150-hour requirement had been implemented in 14 of 15 qualitative characteristics, that improvement in quality was perceived to be only slight. For example, Georgia CPAs rated post-150-hour new hires' amount of supervision needed as improved by only .87 on a 100-point scale (-50 to +50). Eight years later, Wisconsin CPAs were even less impressed by the quality of new hires following the 150-hour requirement's implementation. For all 16 qualitative characteristics, the majority of Wisconsin CPAs evaluated post-150-hour new hires as being no different in quality than those prior to implementation of the requirement.

Interestingly, in one qualitative characteristic for which Georgia CPAs gave their only negative change evaluation, commitment to employer, Wisconsin CPAs also gave their poorest rating. Nearly a third (31.5%) of Wisconsin CPAs perceived new hires after the 150-hour requirement to be weaker or much weaker in their commitment to their employer than were new hires prior to the requirement. Only 7.5% of Wisconsin CPAs found new hires to be stronger or much stronger in this attribute than were new hires prior to the 150-hour requirement.

Similarly, while Georgia CPAs rated new hires after implementation to be relatively strongest in the qualitative characteristics of competency with complex accounting (7.53) and maturity and professional judgment (6.81) in the -50 to +50 scale, Wisconsin CPAs seemed to somewhat agree. These two qualitative characteristics received the two highest percentages of Wisconsin CPAs rating post-150-hour new hires as stronger or much stronger than new hires before the requirement. Over a fourth (28.8%) of Wisconsin CPAs perceived that post-150-hour hires had stronger or much stronger maturity and professional judgment, and about a fourth (25.4%) of them rated new hires as having stronger competency with complex accounting.

With the qualitative characteristic of communication skills, both sets of CPAs had some agreement in their assessment of new hires after the requirement's implementation compared to those earlier new hires. In 2001, Georgia CPAs gave their second-highest rating of improvement—although still modest (7.01 in the -50 to +50 scale)—for the characteristic of communication skills. Nearly a fourth (23%) of Wisconsin CPAs perceived that post-150-hour new hires were stronger or much stronger than earlier new hires in communication skills—the third largest total of "stronger" and "much stronger" percentages for the 16 qualitative characteristics among Wisconsin CPAs.

Those who consider alleged effects of the 150-hour requirement sometimes suggest that new hires following the implementation possess more maturity than new hires in the past—if for no other reason than the fact that the requirement for additional education results in their typically being at least one year older. A similar application of stereotypical cultural differences in the comparison of CPA-ready new hires "today" to CPA-ready new hires before the 150-hour requirement could be with the characteristic of positive responsiveness to change. In many states, the time span separating those before the 150-hour requirement and today's new hires is approximately one-half of a generation. This might lead one to speculate that "today's" new hires would be relatively stronger than their earlier counterparts in their positive responsiveness to change. Such a speculation would likely be less attributable to the process of gaining the additionally required education of the 150-hour requirement and more attributable to the existence of an ever-accelerating changing culture. Popular opinion is that young adults today, having been exposed to such rapid and pervasive change, are more adaptable than were young adults of a generation or more in the past. In response to such a speculation, it is interesting that Georgia CPAs in 2001 rated post-150-hour new hires only very modestly stronger than new hires of the past in the qualitative characteristic of positive responsiveness to change (4.37 in the -50 to +50 scale). Similarly, only 18.9% of Wisconsin CPAs in 2009 rated post-150-hour new hires as stronger or much stronger than new hires prior to the 150-hour requirement for this characteristic. It would seem that CPAs from both states, responding eight years apart, perceive new hires in recent years to be somewhat stronger—but not overwhelmingly so—in a characteristic that stereotypes might predict more dramatic improvement.

Keep This in Perspective

Before one rushes to congratulate the profession on the common perceptions held by CPAs from two states, divided by eight years of time, on the relative strengths of quality of new CPA-ready hires after the 150-hour requirement, (s)he should remember that the previously-discussed attributes represent the relative strengths among assessments of little-to-no-change. Georgia CPAs in 2001 said that quality of post-150-hour new hires had improved as compared to new hires of the past in 14 of 15 characteristics—but only very modestly so. Eight years later, the majority of Wisconsin CPAs said that post-150-hour new hires were no different in quality than those of the past in 16 of 16 qualitative characteristics that were nearly identical to the list considered by the Georgia CPAs. To these respondent CPAs, the gist of the story of the impact on quality of the 150-hour requirement seems to be: "nothing to get excited about."

To further emphasize the perspective from these research results, a strong majority of Georgia CPAs said in 2001 that these "nothing exciting" improvements in quality resulting from the 150-hour requirement came with an employer price tag. In 2009, the majority of Wisconsin CPAs did not agree that such an employer price tag existed for "nothing exciting" in the subject of improved quality. However, about 16% of them perceived it to exist—in an amount surprisingly similar to that estimated in 2001 by Georgia CPAs. In the August 2003 *The CPA Journal* article reporting the research results with Georgia CPAs, a subtitle asked the question, "Getting What You Pay For?" The answer to that question from the collective research results from both Georgia and Wisconsin CPAs seems to be, "We aren't sure we are paying for it, but there does not seem to be great reason for it even if we are."

The Most Interesting Story

Just as most CPAs know that the most interesting story in a firm's financial statements is often in the footnotes, the most interesting story in these research results of perceptions of Wisconsin CPAs about the 150-hour requirement is perhaps in the open comments. The fact that almost exactly one-half of the Wisconsin CPAs who participated in this research chose to add comments to their survey responses illustrates the level of interest that continues to exist in this topic of the 150-hour requirement and quality. One hundred and forty-five Wisconsin CPAs responded to the survey's statement, "Please use this space to make any other comments you would like to make about the 150 hour requirement." These comments ranged from terse one-liners to detailed theses. Collectively, these comments amplify—and sometimes seem to refute—the quantitative data otherwise gained in this research.

"It should be maintained."

Of the 145 open comments, 18 were decidedly or mostly positive about the 150-hour requirement. One respondent succinctly commented simply, "It should be maintained." Others concurred by offering perceived benefits to the requirement such as:

- helping students commit to the profession
- adding to the maturity levels of new hires

- providing a solid foundation for career growth that leads to senior level management opportunities for CPAs
- providing services that business owners need in their accounting and financial executives
- encouraging CPAs to keep abreast of an always-changing field
- producing more well-rounded students/graduates
- maintaining consistency with other states
- achieving or maintaining the public's perception of professional status for CPAs (as compared to lawyers and doctors)
- achieving a greater ability to understand more complex accounting
- making the profession more respected

Similar comments remarked that the requirement has had a positive impact on the profession. Some even called for increasing the requirement to more than 150 hours, and/or requiring a graduate degree (while others criticized the propensity to fulfill the requirement by achieving a masters degree—especially early in ones career). One Wisconsin CPA said simply, "We need to keep this in place to maintain quality CPAs."

"I do not see any difference."

Twenty Wisconsin CPAs offered general comments that were neutral—without elaborating or offering suggested alternatives. One tersely stated as the entire comment, "I do not see any difference." Others similarly indicated seeing no significant change in new hires as compared to those before the requirement, or stated that they saw no value in the requirement for increased education hours. In this type of comment are some that remarked on the requirement <u>only</u> reducing the supply. ("It appears the quality of candidates is the same; however, there are less of them.") Another stated the same general sentiment with a slightly different inference: "I don't think we've gained anything from the 150-hour requirement."

"This was a mistake."

Among 145 open comments by Wisconsin CPAs, 29 were general but decidedly negative about the 150-hour requirement. Some of these are pointed, even blunt:

- just a revenue generator for universities
- the 150 hour requirement is a farce
- the quality of CPAs has actually been diminished by making the exam easier
- nothing more than a disguised method to shrink the supply of accountants
- has only added to the debt load without significant benefits
- if I had the chance to turn the clock back I would not encourage the 150 hour requirement (for reference, I am the CFO of a public company and was a senior manager at a Big 4 accounting firm)
- has not produced better CPAs; it has produced more egotistical CPA candidates
- the 150 hours is a joke
- a way to force a masters degree in accounting
- big CPA firms in bed with the universities as a placement service
- folks with 150 hours are so used to classroom teaching they can't think for themselves

- I could write a book; the 150 hour requirement missed its mark
- weakens our entire financial system
- I thought this was a mistake when implemented and still do
- young staff use an employer to pay for the exam and then move on to another employer
- a huge mistake
- has always been and will always be a stupid idea
- one of the dumbest decisions made by the accounting profession
- I am very saddened by our own stupidity
- I hope that the results of your survey are useful for making changes to these requirements
- dumbs down MBA and other masters programs
- was stupid to begin with
- the profession shot itself in the foot by passing it
- better to have graduates from schools that care about the quality of the students rather than the school's desire to collect tuition
- worse move the profession made
- 150 was not needed; we shot ourselves in the foot
- only allowed certain academic groups the opportunity to create a perceived superior group of students in order for the academians (sic) to control the hiring process with public firms

Make Them Take More Accounting!

About an equal number of additional negative comments offered by Wisconsin CPAs zeroed in on a failure of the 150-hour requirement to dictate that students take the additional hours in accounting or other business courses. Some in this group spoke out in favor of the requirement being changed to add a masters degree; others criticized the tendency of students to pursue a masters degree in their meeting the 150-hour requirement to become CPA-ready. Respondents in this group criticized the requirement for allowing/encouraging students to take "tiddly winks," "silly classes like nursing, athletics, and music," "liberal arts classes or worse blow off classes," "anything including underwater basket weaving," "nonsense courses (art, gym, etc.)" and "courses such as anthropology … --this makes no sense to me." One commenting CPA seemed to summarize the sentiment of this group by stating, "I believe they should require the classes to be business oriented or just get rid of the requirement."

Other Negative, But With Suggestions

About an equal number of additional negative comments offered by Wisconsin CPAs about the 150-hour requirement added other specifics to their criticisms. The largest portion of this group was comments opining that a requirement for experience in accounting should accompany or replace the requirement for more hours of college education. The following is a sampling of these:

- individuals (myself included) learn more in the first three months of public accounting practice than they do in a year of business school
- the extra time would be better spent on the job
- the three years of experience created a better end product than the 150 hours
- today's graduates assume that they can step right in and review work yet most of them do not have a clue …

- a mandatory internship would be more productive than the extra year of school has proven to be
- now it seems taking a test suffices, and who cares if you can actually do the work
- I would rather see some exposure to real world accounting than another year behind a school desk

Some other comments stated that the problem with the 150-hour requirement was that it did not require students to take more classes in writing and communication skills, problem solving, and critical thinking. Some respondents pronounced new graduates' writing and communication skills as "very poor." CPAs offering these comments clearly remembered that these were the qualitative characteristics that were touted for improvements by proponents early in the creation of the 150-hour requirement movement. This group of comments called for greater people skills.

Comments about Changes in Salaries

A final group of comments focused on compensation of CPA-ready staff hired after the 150-hour requirement. Perhaps quibbling with the research survey's insistence on factoring out any effects of supply and demand (or inflation) in estimating changes in salaries after the 150-hour requirement, these Wisconsin CPAs nevertheless wanted to emphasize that they believed one significant effect of the requirement has been a reduction in supply of accountants—causing an increase in starting salaries. One CPA carried this further, opining that this had led to higher fees for accounting services, causing small business clients to seek alternatives to CPAs (such as bookkeepers with poor qualifications). Another commenting along these lines stated that if the objective of the 150-hour requirement was to increase salaries, then it has been a success. This CPA went on to state that the requirement had not improved quality of candidates, but that it was just "a smokescreen for perceived increased competence and actual higher staff salaries." Another similarly stated that (s)he was not sure about the benefit other than it created a labor shortage which increased salaries dramatically. Another glib CPA commenting about this topic remarked simply, "All I know is that it has earned me a lot of coin."

Conclusion

Comments from Georgia CPAs in 2001 revealed sharply divided positions with impassioned opinions on each side about the effects of the 150-hour requirement; comments from Wisconsin CPAs in 2009 provided no exception to this pattern, and even emphasized it. While open comments from research results defy quantification and are therefore susceptible to a criticism of being "only anecdotal" and clearly subjective, it is from reading these comments that one can see clear pictures of the perceptions of CPAs about the 150-hour requirement. Arguably, the prolific and often pointed comments from the Wisconsin CPAs are the most enlightening results from this research. As the dust continues to settle following the implementation in most states of some version of the 150-hour requirement, it is this perception about its costs and benefits that will determine its success in meeting its objectives and its viability for the future of the profession.

Reference

De Berry, T. "The 150-Hour Requirement and CPA Quality" *The CPA Journal,* 2003, 73(8), 26-30

Weight and Work: Can Employers Impose Weight Restrictions?

Suzanne M. Crampton
John W. Hodge

Grand Valley State University

Abstract

The issues concerning weight and obesity are regularly in the news. While some may consider this an individual issue, there is no argument that employers are impacted by the size of their employees. Employees are subjected to many forms of monitoring in the workplace, and many question employers who place weight restrictions on employees or discriminate against individuals whose weight is viewed by the employer as being above a "normal" weight level. Should employers be concerned about the weight of their individual employees and can an employer tell an employee how much to weigh? Research suggests that the majority of overweight and/or obese individuals report being discriminated against regarding employment. Few laws focus on the issue of weight in the workplace. This paper will focus on some of the employment-related concerns associated with employees' weight in the workplace with a review of the legal status of workplace weight requirements.

Introduction

This paper will provide an overview of being overweight at work and its effect on both employers and employees. The focus of the paper will be employment-related problems associated with being overweight. The following areas will be emphasized—the employment-related medical and performance issues associated with obesity, discrimination problems encountered by overweight individuals and weight restrictions imposed on employees, and the complicated legal status of weight restrictions.

Defining Obesity

Obesity is generally defined by calculating a person's body mass index (BMI). The BMI for adults 20 years and older is calculated using standard weight and height categories that are the same for all ages and for both men and women. The BMI is calculated using the following formula: weight (lb.) / [height (in.)]^2 x 703.

This means that to calculate the BMI, divide a person's weight in pounds by height in inches squared and multiply by a conversion factor of 703. For example, if a person weighs 150 pounds and the person's height is 5'5" then the BMI is 24.96 ([150 divided by 65^2] x 703) (Bombak, 2014; Centers for Disease Control and Protection, 2015). Below are the standard weight categories and their respective BMI ranges for adults, according to the Centers for Disease Control and Protection (2015).

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

Luchsinger and Richardson (2006) state that 61.3 million adult Americans (30.5 percent) are obese. Approximately 129.6 million (64.5 percent) Americans are considered overweight. These statistics were reported around 2006. Unfortunately, recent research indicates that obesity rates are increasing among adults and our youth (Luchsinger & Richardson, 2006). Ogden et al. (2014) report that over two-thirds of U.S. adults (68.5%) are overweight or obese. The rates of overweight and obese individuals vary by race, gender, and age—higher for men (71.3%) than women (65.8%); higher for African-American women (82%) and Hispanic women (77.2%) than Caucasian women (63.2%); higher for Hispanic men (78.6%) than Caucasian (71.4%) and African-American (69.2%) men; and higher in the South (nine of the ten highest state obesity rates are in the south) and Midwest—and rates tend to increase with age (Ogden et al., 2014; Robert Wood Johnson Foundation, 2014). Research also shows that the heaviest Americans have become even heavier the past decade (Beydoun & Wang, 2009).

The increase in obesity rates among young people is also significant ("Battling obesity," 2012). Reports that childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years provide evidence on how serious this problem is and how difficult it will be to reverse (Ogden et al., 2014). In 2012, more than one third of children and adolescents (ages 2 to 19) were classified as being overweight or obese and the rate is slightly higher for boys (32 percent) compared to girls (31.6 percent) (Ogden et al., 2014).

In addition to differences between boys and girls, there also appears to be racial and age disparities regarding youth obesity rates. As indicated by the Centers for Disease Control and Prevention (2015), in 2012 the obesity rate among Hispanic youths was 22.4 percent; among white youths it was 14.1 percent; and for black youths it was 20.2 percent. With regard to age, in 2012 8.4 percent of 2-5 year-olds were obese compared to 17.7 percent of 6-11 year-olds, and 20.5 percent of 12-19 year-olds were obese (Centers for Disease Control and Prevention, 2015).

Household income has also been related to obesity rates. In general, the obesity rate is approximately half for those where the head of household completed high school compared to those who did not complete high school (Centers for Disease Control and Prevention, 2014 September).

The lowest obesity rates were observed among white children where the head of household had completed college. However, the obesity rates for girls in households headed by college graduates was lower (7 percent) than boys (11 percent). Low income households reported higher levels of obesity (Centers for Disease Control and Prevention, 2014 September). Obesity rates among children in low-income households were higher where obesity rates ranged from 11.8 percent to 14.5 percent (Centers for Disease Control and Prevention, 2014 December). Obesity rates among children are significant because individuals who are obese as children are more likely to be obese as adults (Centers for Disease Control and Prevention, 2014 December).

Causes for Increased Obesity Rates

Several factors are involved with the increased rates of obesity. The Mayo Clinic (2015) suggests there is a combination of causes and contributing factors that may include: inactivity; unhealthy diet and eating habits; pregnancy; lack of sleep; certain medications; medical problems; genetics; lifestyle; and age.

American culture, technology, and lifestyles are also some of the factors related to why the waistlines of Americans are bulging. Employed adults spend a quarter of their lives at work (Schulte et al., 2007). Eating habits and activity patterns may be affected by the environment at work. Technology and machines have taken over the workplace. As our economy has become more service oriented in comparison to production and manufacturing, more and more employees are working in a cubicle or chained to a computer ("Workplace obesity," 2014). Unfortunately, the culture and food choices available at work may also add to the problem of obesity.

Weis (2006) provides an interesting discussion of economic factors that influence obesity. There is money to be made when we have a significant number of people who are overweight, while at the same time there is a significant number of people trying to lose weight. Weis (2006) provides interesting examples of money associated with the "weight-loss" industry and included among the thousands who benefit are:

- Jenny Craig
- The Centers for Laparoscopic Obesity Surgery (purveyors of the celebrated "Mini Gastric Bypass" or MGB)
- Metabolic Nutrition, distributors of SyneDrex, Thyrene, Phenolox, Hydravox, Ametrol and Liposin
- E-Scripts-MD LLC, sellers of Xenical Phentermine, Adipex, Didrex and Tenuate
- Meta-Booster.com
- The Norwood Weight Loss Program
- Thermadrol

A quick Google search on "weight loss" identified over 50 million sites which sold weight-loss products and programs. The amount of sales associated with the junk food/fast food industry continues to increase. In 2013, the fast food industry's total sales were approximately $191 billion, and it is predicted that this will exceed $210 billion by 2018 (Statista, 2014).
Weis (2006) suggests that the fast food industry portrays itself as being concerned about public health. The nutritional value of their products are explained to the public and information

concerning calories are also provided by this industry. However, Weis (2006) has a pessimistic view of obesity rates in the future. Both sides of the controversy—the weight-loss industry and the junk food/fast food industry—are making too much money for real change to occur.

The Costs of Obesity

There are medical and employment costs associated with obesity. According to the Centers for Disease Control and Prevention (2015), there are many health-related conditions and problems associated with being overweight and/or obese for employees, including:

- Hypertension
- Dyslipidemia (for example, high LDL cholesterol, low HDL cholesterol, or high levels of triglycerides)
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Gallbladder disease
- Osteoarthritis
- Sleep apnea and respiratory problems
- Some cancers (endometrial, breast, and colon)

According to a recent study by Duke University (Biamond, 2011), in 2011 the cost of obesity among full-time employees was estimated to be $73.1 billion per year. For example, 30,000 mostly male employees were evaluated over a three-year period. Normal weight employees cost an average of $3,830 per year in medical claims, sick days, short-term disability, and workers' compensation. In contrast, morbidly obese employees cost about $8067 (Kahn, 2014). Because of the likelihood of obese individuals' increased medical costs including disability and workers' compensation, Gillette (2014) suggests the costs associated with obesity may be greater than the costs associated with age.

In 2008, the average medical cost for a family of four in the U.S. was $15,609 (Heinen & Darling, 2009). Obesity rates were a factor. Twenty-seven percent of the growth of employer health-care spending between 1987 and 2001 was attributed to obesity. ("Battling obesity," 2012; Heinen & Darling, 2009). Health care spending is generally estimated to be 30 percent higher for obese adults less than 65 years of age than for normal-weight adults (Biamond, 2011). It has also been suggested that the obese employee is more likely to be absent, which is expected if the medical problems associated with obesity are considered.

The performance costs associated with obesity are more difficult to measure than the medical costs. Obesity is associated with physical activity problems such as endurance and fatigue. For instance, an article published in *Science Daily* suggests that there is a 40 percent decline in performance involving the ability to use one's hands to grip items among obese individuals and they exhibited a greater decline in task performance (Virginia Tech, 2014). Obesity is associated with physiological changes including a decrease in blood flow which limits the supply of oxygen and energy causing faster muscle fatigue. Workers who are obese may need longer rest periods to

return to their normal state of muscle functioning after physical activity ("Workplace obesity," 2014).

Discrimination and Obesity

Considering our culture's preference for thinness and the medical and performance problems associated with obesity, it is not surprising that obese individuals are subject to discrimination in the workplace. As indicated by Blumgart (2014), many employers freely discriminate against individuals they perceive as being fat. A 2009 survey of 2000 employers found that 93 percent of them would choose an applicant of normal weight over an equally qualified one who was obese (Blumgart, 2014). Fifty-two percent of obese employees, according to one poll, believed their employers discriminated against them, and another study conducted by Yale University found that 40 percent of obese individuals had experienced some form of discrimination. Nationwide, Blumgart (2014) suggests that between 1995 and 2008, 60 percent of obese Americans reported at least one incident of employment-based discrimination. The reported rates were higher for female employees compared to males.

Borowski (2011) also concluded that there is a wage penalty for employees who are obese. Again the obesity discrimination problems were greater for obese females than for obese male employees. Obese women earn up to six percent less than their thinner counterparts while obese men earn three percent less than their thinner counterparts (Borowski, 2011).

There are few laws focused on the issue of obesity in the workplace. There are no federal laws prohibiting this form of discrimination and Michigan is the only state that specifically includes weight as a protected characteristics in its state's Elliott-Larsen Civil Rights Act (Holmquist, 2010). It prohibits an employer from "[f]ail[ing] or refus[ing] to hire or recruit, discharge, or otherwise discriminate against an individual with respect to employment, compensation, or a term, condition, or privilege of employment because of . . . weight . . ." (Michigan Legislature, 2009). Michigan employers also cannot "limit, segregate, or classify an employee or applicant for employment in a way that deprives or tends to deprive the employee or applicant of an employment opportunity, or otherwise adversely affects the status of an employee or applicant because of . . . weight . . ." (Michigan Legislature, 2009). For plaintiffs to win a weight discrimination suit in Michigan they must show that "weight was a determining—not necessarily the sole—factor in the adverse employment action, i.e., the unlawful adverse action would not have occurred without weight discrimination" (Ungerman & Jones, 2012) This, however, can be a very difficult standard to satisfy because a plaintiff must prove discriminatory intent on the part of the employer or causation to prevail in a disparate treatment case, or the plaintiff must show that the employer only hires applicants who are not overweight (and rejects those who are) in order to prevail in a disparate impact case (Katz, 2007; Ungerman & Jones, 2012).

However, while Michigan is the only state that includes weight in its civil rights act, Holmquist (2010) suggests that even in Michigan the same attention is not given to obesity-related issues as given to problems associated with race, religion, and gender. For example, some argue that sexual orientation issues today receive more attention than obesity. While the focus of this paper is not to detail what other legislators have passed regarding weight, it should also be noted that there are six cities that have laws prohibiting discrimination based on weight—Birmingham,

NY; Urbana, IL; Madison, WI; Washington, D.C.; Santa Cruz, CA; and San Francisco, CA (Ungerman & Jones, 2012).

The absence of federal and state laws prohibiting discrimination against obesity is problematic for both overweight employees and their employers. Employers monitor employees' performance, demand that their employees maintain appropriate dress and appearance on the job, ban employees from engaging in certain behaviors at work, and tell employees where and when they can smoke. Our society is appearance-obsessed and some employers are trying to control the appearance of their workforce by imposing weight restrictions as a condition of employment. Can an employer tell an employee how much to weigh? Can employers demand that employees maintain a certain weight to promote a certain image while working? For example, do you typically see an overweight receptionist or trainer at a fitness facility? Can preferential treatment be given to individuals who meet certain weight restrictions? Can weight and appearance be considered a bona-fide occupational qualification (BFOQ)? Unfortunately, there are no easy answers to these questions.

Although there are no federal laws and few state and municipal laws that prohibit the use of appearance and weight requirements in making employment decisions, the Council on Size & Weight Discrimination along with the Alexander Hamilton Institute (2008) state that appearance and weight requirements cannot violate the Civil Rights Act of 1964. The EEOC (Equal Employment Opportunity Commission) has been very restrictive and skeptical concerning the use of appearance as a BFOQ. BFOQs are performance-related factors that are necessary to the normal performance of a job and include such things as education, skills, and experience but may also include age requirements (e.g., minimum age to serve alcohol), gender (e.g., to work in a dressing room) or other factors that might typically be considered protected characteristics by federal or state employment laws. In the state of Michigan, any weight requirement must be job related.

Appearance is considered an important component of an employer's dress code. Deschenaux (2010) suggests that employers view dress codes as a reflection of their company's image and values. The legal position taken by the courts is that employers can use dress codes that reflect the norms of their community. The position taken by the EEOC seems to be more restrictive than those taken by the judicial system. The EEOC suggests that weight and appearance requirements should be limited when defining BFOQs. However, businesses must remember that the EEOC only makes recommendations and offers guidelines to employers and society while the courts make the decisions interpreting our employment laws.

Finally, the absence of federal and state laws regarding obesity and appearance in the employment environment creates confusion for both employers and employees. Companies such as restaurants like Hooters, and industries like the airline industry and casinos tend to have appearance-related policies. As stated earlier, America values thinness. Therefore, appearance and obesity will continue to be legal issues. Puhl and Heuer (2011) examined public support for legislation to prohibit discrimination in the United States and reported that they found that there was substantial public support for laws protecting overweight individuals from employment discrimination (65% of men and 81% of women). The final problems we will discuss are related to obesity, appearance, and the Americans with Disabilities Act (ADA).

Obesity and the Americans with Disabilities Act (ADA)

The federal ADA does not explicitly include obesity as a disability. However, the EEOC in its interpretation of the laws and its guidelines issued to employers has now concluded that being obese should be considered a disability under the Americans with Disabilities Act (ADA) (Gregg, 2011; Katz, 2012). The recommendation by the EEOC, along with the American Medical Association (AMA) defining obesity as a disease in 2013 have resulted in an increase in obesity-related discrimination cases (Hodges, 2013). It should be noted that in order to be considered disabled, the obese individual should (1) have a physical or mental impairment that substantially limits the person from performing a major life activity as a result of his/her obesity, or (2) has had such a disability or (3) is perceived to have such impairment. Examples of major life activities are taking a shower, combing your hair, getting dressed, etc.—basically being able to take care of yourself. In defining who is protected under the ADA, it is important to note that the definition includes individuals who not only have a protected disability but who also have a record of such an impairment or are regarded as having an impairment. Several federal courts have concluded that obesity may be covered as a disability (Katz, 2012).

Of interest to this issue are the recent amendments in 2008 to the ADA under the Americans with Disabilities Act Amendments Act (ADAAA) that may impact the success of plaintiffs who file weight discrimination claims. The ADAAA broadened the protections of the ADA to a larger set of individuals, which might include obese people. However, until more cases are filed under the ADAAA, it will be difficult to determine how weight restrictions on applicants and employees might be treated by the courts under the ADAAA.

While the ADAAA may not have seemed to make substantial changes to the definition of a disability, an article by Employment Practices Solutions ("Weight discrimination," 2009) suggested that it might now be easier to make a claim under the third part of the ADA's disability definition—someone who is "regarded as" having a physical or mental impairment that substantially limits one or more major life activities. The ADAAA defines a disability as:

1. A physical or mental impairment that substantially limits a major life activity; or
2. A record of a physical or mental impairment that substantially limits a major life activity; or
3. When an entity (e.g., an employer) takes an action prohibited by the ADA based on an actual or perceived impairment.

This article indicates that it might be easier to make a claim because the plaintiff does not need to establish that the disability he or she is "regarded as" having is actually a disability that substantially limits one or more major life activities. What this means is that to satisfy the ADA's "regarded as" standard today, an individual must only show that he or she was subjected to an action prohibited under the statute (such as not being hired or terminated) because of either an actual or a perceived impairment. So whether obesity or being overweight today is considered an impairment under the legal definition of a disability does not matter so long as a person is perceived to be limited/impaired because of his/her weight and can establish discrimination. Note that just being entitled to ADA protections under the definition does not mean the person has automatically been a victim of unlawful discrimination—this determination must be made separately.

It is also important to note that the ADAAA states that the "regarded as" claims cannot be based on "minor or transitory" impairments, which it defines as an impairment with an actual or expected duration of six months or less (U.S. Department of Labor). This can still be confusing because some might argue that being overweight is minor and/or transitory. What also will continue to be confusing is that the ADAAA states that employers are not required to provide reasonable accommodation to individuals who are "regarded" as being disabled. This has been controversial in the past as federal courts have been inconsistent in rendering decisions on this. Some experts argue that under the ADAAA, employers should be "cautious and err on the side of considering most impairments to be disabilities and attempting accommodation" (Ford, 2012, While Not Every section, para 2).

In a review of past court decisions related to weight restrictions, Ungerman and Jones (2012) concluded that the recent amendments to the ADA suggest that weight restrictions may not be a problem if employers can show that the restrictions are "directly related to the essential functions of the job" and are "required to ensure that the employees safely perform their jobs without endangering themselves or others" (Conclusion section, para 1). They also state that the ADAAA did not make any changes to the burden of proof that is associated with the term "qualified," which means that the employee must still be qualified for the position. It seems that employers will be able to continue to apply standards that are directly related to performing the essential functions of the job when selecting qualified employees (who are able to perform the essential functions of the job). While we await more published case opinions on the ADAAA, available case law suggests that it is critical that employers examine each employee's condition and request for reasonable accommodation on an individual basis and document each step of the individual assessment. Making incorrect decisions regarding a person's disability or accommodation request can have major implications.

Conclusion

What the future holds for America regarding its battle with obesity is difficult to predict. The bad news is that current data suggests the battle against obesity is being lost. The good news is that our culture is paying more attention to factors associated with our increasing waist lines. The bottom line must depend on the individual since each person has to decide his/her diet and lifestyle. Unfortunately, technology, the fast-food industry, and social media tend to discourage physical activity. Many jobs in the corporate setting today require little physical activity. Outside the workplace, instead of playing baseball or football, computers and electronic games have become the centerpiece of many individuals' lives. Thus, the social and cultural pressures to encourage weight loss will continue.

References

Alexander Hamilton Institute. (2008, June 9). Weight discrimination in the workplace: Realities and legalities. *Business Management Daily*. Retrieved from http://www.businessmanagementdaily.com/19486/weight-discrimination-in-the-workplace-realities-and-legalities

Barkin, S. L., Heerman, W. J., Warren, M. D., & Rennhoff, C. (2010). Millennials and the world of work: The impact of obesity on health and productivity. *Journal of Business Psychology, 25,* 239-245. doi: 10.1007/s10869-010-9166-5

Battling obesity: How employers can tackle the workplace epidemic. (2012). *Business Insurance White Paper.* Retrieved from http://www.businessinsurance.com/assets/PDF/CB83149104.PDF

Beydoun, M. A. & Wang, Y. (2009, January). Gender-ethnic disparity in BMI and waist circumference distribution shifts in US adults. *Obesity, 17*(1), 169-176.

Biamond, P. (2011, April 26). Exercise in sound management. *BusinessWest, 26*(23), 22. Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/ abidateline/docview/868035112/abstract/954FEC1703854463PQ/1?accountid=39473

Blumgart, J. (2014, April 8). You don't have a right to be obese at work. *Pacific Standard.* Retrieved from http://www.psmag.com/politics-and-law/dont-right-obese-work-78497

Bombak, A. (2014). Obesity, health at every size, and public health policy. *American Journal of Public Health*, *204*(2), e60-e67. doi: 10.2105/AJPH.2013.301486. Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/abiglobal/docview/1499845715/D3D066457BF34AA4PQ/1?accountid=39473

Borowski, S. (2011, November 15). The heavy truth about weight discrimination. *Insight Into Diversity*. Retrieved from http://www.insightintodiversity.com/diversity-inclusion/the-heavy-truth-about-weight-discrimination-by-susan-borowski

Centers for Disease Control and Protection (2014, September 3). Childhood obesity facts: Prevalence of childhood obesity in the United States, 2011-2012. Retrieved from http://www.cdc.gov/obesity/data/childhood.html

Centers for Disease Control and Protection (2014, December 11). Childhood obesity facts. Retrieved from http://www.cdc.gov/healthyyouth/obesity/facts.htm

Centers for Disease Control and Protection (2015, February 23). Healthy weight – it's not a diet, it's a lifestyle! *CDC.* Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html#Interpreted

Deschenaux, J. (2010, June 17). Hooters sued for weight discrimination. *Society for Human Resource Management*. Retrieved from http://www.shrm.org/legalissues/stateandlocalresources/pages/hooterssued.aspx

Ford, S. T. (2012, September 5). The ADAAA – four years after its enactment, just how broad has this become. *Troutman Sanders.* Retrieved from http://www.troutmansanders.com/the-adaaa--four-years-after-its-enactment-just-how-broad-has-this-become-09-04-2012/

Gillette, B. (2014, March 14). Obese employees a great risk for workers' compensation claims than older workers. *The Mississippi Business Journal*, 36(11), 12. Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/abidateline/docview/1519636740/11169D0FD16B4446PQ/1?accountid=39473

Gregg, B. (2011, February 23). Obesity is a disability, says EEOC. *DiversityInc.* Retrieved from http://www.diversityinc.com/diversity-and-inclusion/obesity-is-a-disability-says-eeoc/

Hodges, J. M. (2013, November 17). A new wave of litigation: Obesity related disability discrimination. *Diversity Insight*. Retrieved from http://blogs.hrhero.com/diversity/2013/11/17/a-new-wave-of-litigation-obesity-related-disability-discrimination/

Holmquist, J. (2010, July 18). Weight discrimination in Michigan: Hooters, part 1. *Michigan Employment Law Connection.* Retrieved from http://www.michiganemploymentlawconnection.com/2010/07/weight-discrimination-in-michigan.html

Kahn, K. (2014, May 13). Obese employees cost employers thousands in extra medical costs. *Center for Advancing Health: Health Behavior News Service.* Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/abidateline/docview/868035112/abstract/954FEC1703854463PQ/1?accountid=39473

Katz, D. M. (2012, October 5). Obesity as a covered disability under the ADA. *The Bureau of National Affairs, Inc. Daily Labor Report*, ISSN 0418-2693.

Katz, M. (2007, May 21). No intent, no foul. *Legal Times, XXX*(21). Retrieved from http://www.law.du.edu/documents/employment-and-labor-law/publications-katz-no-intent-no-foul.pdf

Luchsinger, V. & Richardson, L. (2006). Obesity as a factor in workforce productivity, economic costs, and options for remedies. *The Business Review, Cambridge, 6*(1), 274-279.

Mayo Clinic. (2015). Diseases and conditions: Obesity. *Mayo Foundation for Medical Education and Research*. Retrieved from http://www.mayoclinic.org/diseases-conditions/obesity/basics/risk-factors/con-20014834

Michigan Legislature. (2009). Section 27.2202 Elliott-Larsen Civil Rights Act (excerpt) Act 453 of 1976. Retrieved from http://www.legislature.mi.gov/(S(fbhkz55ezgbs1ke12ue1u4ok))/mileg.aspx?page=getObject&objectname=mcl-37-2202

Ogden C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association, 311*(8), 806-814.

Puhl, R. M. & Heuer, C. A. (2011). Public opinion about laws to prohibit weight discrimination in the United States. *Obesity,19*(1)*,* 74-82. doi:10.1038/oby.2010.126

Robert Wood Johnson Foundation. (2014, September). The state of obesity: 2014. *Trust For America's Health*. Retrieved from http://healthyamericans.org/assets/files/TFAH-2014-ObesityReport%20FINAL.pdf

Schulte, P. A., Wagner, G. R., Ostry, A., Blanciforti, L. A., et al. (2007). Work, obesity, and occupational safety and health. *American Journal of Public Health, 97*(3), 428-436. Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/abiglobal/docview/215081053/2E9E3995C8B54F0APQ/1?accountid=39473

Statista. (2014). Statistics and facts about the fast food industry. *Statista*. Retrieved from http://www.statista.com/topics/863/fast-food/

The Council on Size & Weight Discrimination. Retrieved from http://www.cswd.org/docs/legalaction.html

Ungerman, J. I. & Jones, J. N. (2012, September 21). Will the imposition of weight restrictions in the workplace present a hefty problem for employers under the ADA? *Thomson & Reuters News & Insight*. Retrieved from http://www.huntonlaborblog.com/uploads/file/Imposition_of_weight_restrictions.pdf

U.S. Department of Labor. Office of Federal Contract Compliance Programs (OFCCP) The ADA Amendments Act of 2008: Frequently asked questions. Retrieved from http://www.dol.gov/ofccp/regs/compliance/faqs/ADAfaqs.htm

Virginia Tech. (2014, July 23). Obesity linked to low endurance, increased fatigue in the workplace. *ScienceDaily*. Retrieved from http://www.sciencedaily.com/releases/2014/07/140723105953.htm

Weight discrimination in the workplace. (2009, August). *Employment Practices Solutions.* Retrieved from http://www.epspros.com/NewsResources/Newsletters?find=13411

Weis, W. L. (2006). When the forces of industry conflict with the public health: The case of obesity. *Academy of Health Care Management Journal, 2,* 1-10. Retrieved from http://search.proquest.com.ezproxy.gvsu.edu/abiglobal/docview/214438264/5B2275B5D0504A97PQ/2?accountid=39473

Workplace obesity. (2014). *You-Can-Learn-Basic-Employee-Rights.com.* Retrieved from http://www.you-can-learn-basic-employee-rights.com/workplace-obesity.html

Is there a Relationship Between Generational Category and Job Hopping?

Avinash Waikar, Southeastern Louisiana University
Brian Sweet, Southeastern Louisiana University

Abstract

It is a general belief that today's younger workers belonging to the Millenial group exhibit different traits as well as frequent job hopping than the previous generations. They crave rapid career satisfaction and advancement compared to the other generations. They also place a high value on flexibility, team work, diversity, and feedback. This leads to difficulty in employee retention mainly due to the fact that many Millenials simply move on when their expectations are not met. Thus, many managers today are faced with the difficult tasks and decisions that shape policies and requirements to meet expectations in order to gain and retain talented Millenials for the workforce. They are also finding that it's a very difficult balance to encourage loyalty, performance, promotion, and overall job satisfaction that meets the expectations of this demanding generation. Are Millenials different from the previous generations of workers? This study attempted to determine if there is a relationship between generational category and job hopping since conflicting opinions exist about this issue. Results confirmed the relationship and showed that Millenials are more likely to job hop than Baby Boomers or generation X.

Introduction

Generational differences have emerged over the last few decades and have been a concern as well as a major topic of discussion while individuals are entering the workforce after completing their educational goals. Many veteran employees and managers are finding that the newer generation of employees in the last few decades have many noticeable traits that differ and stand out more so from prior generations. Generations are separated by groups of individuals that share birth years during the same time period, meaning many of their growth traits were formed during similar events and share various characteristics as a result.

The three core generations in our current workforce today are Baby Boomers, Generation Xers, and Generation Yers/Millenials. Baby Boomers, born between 1946 and 1964, is a generation shared by people that are known to have a very strong work ethic, hold loyalty and wealth high on the priority list. Gen Xers, born between 1965 and 1980, are stereotypically very independent and have issues with loyalty, believed to be stemmed from events such as the energy crisis, and economic recession that took place during these years. Gen Yers, or 'Millenials', are the newest generation entering the workforce, born between 1981 and 2000. Millenials are typically the most technologically advanced of the three generational categories. This generation also places a high value on diversity, flexibility, and team work. Millenials are also known to be the most demanding in regard to the feedback and direction received within the workplace.

Among the three main generational categories within the workforce today, we will focus on the Millenials, as this group brings about the highest frequency and noticeable variances in career

changes in the shortest amount of time. Thus, this research attempts to determine if the job hopping displayed by the Gen Yers is in fact more frequent out of the three categories. One area of concern in any business environment as Millenials enter the workforce is the employee turnover related to job satisfaction. Managers in many business environments today are faced with the difficult tasks and decisions that shape policies and requirements to meet expectations in order to gain and retain talented Millenials for the workforce. Many businesses are now finding that it's a very difficult balance to encourage loyalty, performance, promotion, and overall job satisfaction that meets the expectations of this demanding generation.

Managers in businesses across the board face difficulty in employee retention mainly due to the fact that Millenials crave rapid career satisfaction and advancement compared to the other generations. They take different job because of dissatisfaction or better pay or a better fit. The heightened craving is largely due to the experiences and events of advances in technology and globalization during their years of upbringing and education. Some feel expectations are at an all-time high and do not appear to be shifting while Millenials show signs of much entitlement compared to their older managers and coworkers. This entitlement along with many businesses that are unable to provide a workplace environment designed to meet the expectations of the Millenials in the workforce are likely some of the reasons why job-hopping has become so prevalent in the last decade or so. While companies struggle with the fact that time and resources are spent hiring and training employees and they are in most cases leaving before the companies can gain any return on their investments, it's important to become familiar with the impacts and challenges that businesses are facing today regarding job-hopping, a growing and may be a potentially problematic issue.

As Baby Boomers approach the retirement age, more and more Millenials are entering the workforce. As the largest generation in American history, 95 million strong, there is little doubt that Millennials will substantially impact the U.S. economy and the world. In a little over a decade, Millenials are projected to make up roughly 75% of the global workforce (Lublin, 2015).

Millenials and Job Hopping

Do Millenials really job hop more than other generations? There are mixed opinions and data reported in this regard. Cho (2015) says there are conflicting data and research about whether Millenials switch jobs more frequently than previous generations. He reported that a 2012 Pay Scale survey found that the Millenials change jobs every two years. Fallon (2014) stated that Millennials don't seem to like staying in one place for too long. She says that it's not uncommon for a 20-something to have worked for three or four different employers just in the last few years. Meister (2012) reported that the average worker in 2012 stayed at job for 4.4 years according to Bureau of Labor Statistics but the expected tenure of the youngest employees was about half that. She further stated that 91% of Millenials were expected to stay in a job for less than three years according to a survey. Lublin (2015) says employees of all ages move from job to job now, but this trend is even more pronounced for workers at the younger end of the spectrum. She quotes that according to Bureau of Labor Statistics from 2012, median employee tenure for workers aged 25 through 34 is just 3.2 years now, which is 1.4 years less than the median tenure for all employees.

In contrast Casselman (2015) claims that the myth of the job hopping Millenials is just that – a myth. He says the data consistently shows that today's young people are actually less professionally itinerant than previous generations. He says that younger workers do tend to change jobs more often

than older workers, but that has always been true even in the previous generations. Guo (2014) states that recent generation workers probably have not become habitual job hoppers. He says that every two years the Census Bureau asks a sample of Americans how long they have been at their current job. That number for younger workers has not changed much in the past thirty years. He says voluntary job hopping is beneficial for finding a better paying or a better fitting position. He further states that when economists compared people who started their careers in the 80's with people who started on 00's, they find that the two generations are more or less identical in terms of how often people change jobs at least before the great recession threw a wrench in the matters. Surprisingly Internet Search (2015) revealed that a typical worker spent four years in 2004 at their company while the number jumped to 4.6 years in 2014, a 15% increase in loyalty, suggesting that Millenials may not be job hopping as much.

Huppke (2013) claimed that a new survey released exclusively to Chicago Tribune examined the job-hopping nature of Millennials and raised some important questions about how much it costs companies to find and replace young workers. Here are some findings from the survey conducted by the consulting firm Millennial Branding and the online career network Beyond.com:

• 30 percent of companies surveyed lost 15 percent or more of their millennial employees in the past year.

• 87 percent of companies said it cost $15,000 to $25,000 to replace a departed millennial employee.

• Most said Millennials leave the company because they don't consider it "a good cultural fit."

• About 30 percent leave because they've gotten a better offer at another company, but almost the same percent say they left because their career goals weren't in line with their employer.

This survey puts some helpful data to a trend that everyone knew, at least anecdotally, was happening – a decreased job satisfaction? This generation has different views of the workplace and what a workplace should be like, and the companies aren't evolving to meet those changes and needs fast enough. The survey found that 80 percent of employers believe they can increase their millennial retention rate. That may be optimism. It doesn't appear that they necessarily know how to do it. Happke (2013) says workplace flexibility was one of the top concerns for Millennials, but only half of the employers are using it. So there seems to be an inconsistency here.

He further says that the issue with job hopping is that we have to understand that loyalty is something that a company now must earn. Millennials want clear missions, flexibility and opportunities to constantly improve their skills. You know who else would like that? - Practically everybody who works says Happke (2013). Can employers deliver that?

Marte (2014) of Washington Post speculated reasons for job hopping. He said that job hopping has emerged as one of the few ways to escape lower wages especially since the rewards that companies have historically offered for employee loyalty – pensions and pay raises continue to diminish. This means that employees don't get as much for staying with the same company for long. Portability of benefits such as 401(k) could also be a contributory factor. Given the conflicting opinions about job

hopping, the cost of job hopping and the expectations of the MIllenials, we chose to do some investigation and research related to this topic in hopes of better comprehending the correlation and trends of the generational categories regarding job-hopping.

Methodology

Data was collected using a random survey of connections and coworkers within a network of more than one thousand business professionals. Participants were required to be working at least ten years to be acceptable as a survey participant. Data was gathered on age and generation grouping as well as career and/or company changes in the last ten years of their professional careers. A total of 91 usable responses were received.

The first variable in the data set was "Generational category" which had three levels as shown in Table 1. The second variable included in the study was "Number of Company changes in the last ten years of the participant's Professional Career" to assess the level of job hopping by the participant. Thus, levels of job hopping were assessed by noting the number of company changes in a ten year period by the individuals. This qualitative variable also had three levels as shown in Table 2. A zero to 1 "company changes" in ten year period was considered "Low job hopping." 2 to 3 changes were considered as "Moderate job hopping" while 4 or more company changes were considered as "High level of job hopping" for analysis in this study. The contingency table for the data collected and classified based on these two variables is shown in Table 2 which shows the frequencies of job changes by individuals by generation category.

Table 1: Generational Categories

	Generation category	Birth Year	Current Age
1	**Baby Boomers (BB)**	1946 - 1964	68-50
2	**Generation X (GEN X)**	1965 - 1980	49 - 34
3	**Generation Y/Millennium (GEN Y)**	1981 - 2000	33 - 14

Table 2: Contingency Table for Generation category and Level of Job Hopping

(Frequencies by Category and Number of Job Changes in a 10 Year period)

Generation Category	0-1 Job Changes	2-3 Job Changes	4 or More Job Changes
Baby Boomers BB	15	3	8
Generation X	10	9	14
Generation Y	1	11	20

Table 3: Expected Frequencies (Expected Number of Job Changes if null was true)

Generation Category	0-1 Job Changes	2-3 Job Changes	4 or More Job Changes
Baby Boomers BB	7.43	6.57	12.00
Generation X	9.43	8.34	15.23
Generation Y	9.14	8.09	14.77

Table 3 shows the "Expected Frequencies" for the generational categories and level of job hopping if the null hypothesis of no relationship between generational category and job hopping was true (See null hypothesis 1 below).. Data was used to test the following hypotheses:

Null Hypothesis 1: There is no relationship between Generational Category and Job-hopping in the workplace.

Alternate Hypothesis 1: There is a relationship between Generational Category and Job-hopping in the workplace.

Null Hypothesis 2: Millenials are not more likely than Baby Boomers and Gen Xers to job-hop during their careers.

Alternatel Hypothesis 2: Millenials are more likely than Baby Boomers and Gen Xers to job-hop during their careers.

Results and Conclusions

In testing these hypotheses, our objective was to find evidence that job-hopping is in fact related to differences in generational category and also to point out the fact that the younger generation of 'Millenials' is proving the be the most complex and problematic for businesses that are struggling to retain good talent while remaining profitable in a down economy. The data was analyzed using Microsoft EXCEL software to conduct the Chi Square test of independence to check if the two variables were independent or related. The expected frequencies (expected number of job changes) under the assumption that the null hypothesis is true were calculated and are shown in Table 3. The results indicated that the calculated Chi Square Test Statistic was 32.31 which was much higher than the Critical Chi Square 9.48 for 4 degrees of freedom, at 5% significance level. The p-value for the test was < 0.005 indicating a strong rejection of null hypothesis 1.

A comparison of the observed number of job changes with the expected number of job changes in various cells of the contingency table led to rejection of the null hypothesis 2. A comparison showed that significantly more than expected Baby Boomers exhibited low job hopping activity as well as significantly fewer than expected Baby Boomers exhibited high level job hopping. In contrast, significantly way fewer than expected Millenials indicated low job hopping and significantly more than expected Millenials indicated high job hopping as seen in Tables 2 and 3. Job hopping among the generation X workers was fairly as expected. Thus, we conclude that the Millenials are more likely than Baby Boomers and Gen Xers to job-hop during their careers.

Thus, we conclude that there is a relationship between generational category and job hopping. We agree with some of the other researchers that Millenials are more likely to job hop in their careers compared to baby boomers and even the generation Xers.

Implications

We hope the results will provide clarity and informed guidance to enhance decision making regarding a strategy for hiring and retaining employees of the proper generational categories for the positions in question within a business organization. Another hope is that it will guide a strategy for improving corporate structures through programs that will reach and even exceed expectations regarding career development for all generational categories, particularly the 'Millenials' which are currently the most complex and challenging to satisfy and retain. In other words, as Pathak (2015) reported a participant in an anonymous focus group to say "Instead of bracing for job hopping, companies should place more effort on creating an environment that gives their young millennial employees opportunities that they can't get anywhere else. Otherwise, moving on to a bigger name with a bigger check will be more appealing and rewarding" which may further promote job hopping.

References

Casselman, Ben. "Enough Already about the Job Hopping Millenials." retrieved from www.fivethirtyeight.com/datab/, 2015.

Cho, Hanah. "Defying stereotype, many Millenials avoid job hopping." Retrieved from hcho@dallasnews.com. 2015.

Fallon Nicole. "Solving the Mystery of Gen Y Job Hoppers." Retrieved from www.business newsdaily.com/7012.millenial-job-hopping.html August 22, 2014

Guo, "Millenials aren't changing jobs as much. That's a big problem for economy." Retrieved from www.washingtonpost.com/news/storyline/wp/2014/09/04/, 2014.

Huppke, R. "The Cost of Millenials' Job Hopping." Retrieved from www.aboutbeyond.com/news/ChicgoTribune, August 9, 2013.

Internet Search (2015). "Millemials are not Job Hopping (And that's a Bad Thing.)" Retrieved from www.job.com/career-advice/job-search-advice/millenials/. 2015

Lublin, N. and Hoffman, R. "A Solution to Millenials' High Turnover Rate." Retrieved from www.fastcompany.com/3039130, Nov. 30, 2014.

Marte, Jonnelle. "Millemials aren't job hopping as much as previous generations." Washington Post, December 5, 2014.

Meister, J. "Job Hopping is the New Normal for Millenials," Retrieved online from www.forbes.com/sites/jeannemeister/2012/08/14/job, 2014

Pathak, S. "How agency Millenials view the job hopping crisis" Retrieved from www.digiday.com/agencies/ask-millenial-whats-job-hopping. 2015.

Advertising Expenses as a Business Cycle Indicator?

Mario Roncador

University of Alaska Anchorage

Abstract

This research examines how advertising expenses may be considered a predictor for business cycles. Business cycle predictors are usually recognized in macroeconomics as unemployment, savings and investment and inflation (see the NBER website for some definitions). There is little research on the link between how a company responds during expansions or slowdowns. Advertising expense is an operating expense and therefore, when a company needs liquidity, cutting advertising expenditure is perhaps the quickest way to have liquidity. To see if and in what ways firms respond to business cycles, we collected advertising expenditure and revenue data for all the US companies from 1974 to 2013. We ran a correlation analysis between some measures of aggregate economic activity and relative advertising expenditures using quarterly data. Our analysis shows companies vary their expenditures perhaps in anticipation of changes in business cycles. Our analysis is by no means comprehensive or complete. However, it is hoped that discussions will go beyond anecdotes and more toward using empirical models to decipher the proposed link.

Introduction

Macroeconomics studies the behavior of aggregate economy. Firms do influence the economy and are influenced by it. Although this statement sounds obvious, all the models explaining and predicting GDP tend to use macroeconomics variables. In this study, we take a non-conventional approach. Advertising expenses, as an operating expense, is easy and quick to manage in times of economic fluctuations. Therefore, when in need, cutting advertising expenditure is perhaps the quickest way to have money availability. Firms try to manage their expenses in order to have less volatility in cash flows. This is perhaps an attempt on their part to anticipate and mitigate the potential negative effects in recessions or to realize competitive advantages during expansions.

Through this study of correlation between advertising expenses and business cycles, we intend to look for statistical support to the common entrepreneur's idea that advertising expenses are the easiest and quickest way to save money during recession periods, when firms face declining in revenues and cash. Our purpose, ultimately, is to show if the overall advertising expenses are reduced or boosted some time before the beginning or the end of a recession. Section II presents our literature review. Section III describes our data, research methodology and some models. Finally, Section IV concludes.

Advertising and Business Cycles

This study uses a number of sources: First, it has conducted a search of the words

"advertising" and "business cycle" in three renowned electronic databases: EBSCOhost, JSTOR, and ScienceDirect. Second, the articles respecting the above search criteria in order to find out the widest accepted outlook about the relationship between advertising expenses and business cycle have been reviewed. Third, different perspectives regarding the link between advertising expenditures and business cycles have empirically been tested.

The beginning of the advertising expenses investigation starts with the 1941 study by Louis C. Wagner, who shows how firms behaved through expansions and contractions in determining their appropriate advertising amount. More precisely, Wagner claims that firms increased their effort during recessions when revenues were more difficult to obtain, whereas they reduced advertising when sales were easier to get. Even though this article is a little out of date, more recent research shows the same type of relationship. In the essay about the effectiveness of R&D and Advertising by Benedict et al. (2011), find that R&D and advertising expenses are tools used by companies to increase their revenues. In the meantime, contractions can reduce their effect, and advertising's effectiveness is systematically curbed by the cycles that the industry faces.

Rothenberg (2008) shows that advertising expenditures seem to be about 2% of GDP from 1919 onward. He concludes that advertising expenses are positively related to the economic output. Ozturan and Ozsomer (2011) find that the market competition is a crucial factor for advertising expenditure during recessions. Firms which act in intense competitive markets are more concerned with attracting consumers despite the tough economic conditions. Meanwhile, firms acting in stable markets are more likely to reduce their advertising expenses. This research indicates that advertising expenditure is sensitive to GDP and during economic slowdowns and, moreover, companies tend to follow a "cutting heard behavior."

It is unlikely that this "cutting heard behavior" coincides exactly with the beginning or the end of a recession, simply for the time that news need to spread out. When a recession is impending, an entrepreneur could possibly receive some signals of change from the markets. For example, an entrepreneur could see plunging consumer confidence, less liquidity available and difficulty to obtain loans. This sense of change could lead to an adjustment of the expenditure structure in order to face the upcoming challenge. Alternatively, it is possible that firms will get ready to capture that increased demand during expansions by starting to spend more strongly through the end of recessionary periods. If this is the case, one may expect to see a stronger effect of advertising before the expansion is fully in place.

This pattern reflects the possible ways advertisers "behave". As Avi Dan (2011) explains in his article, one of the indicators of the slowdown is that inventories start to pile up before the recession is officially announced. And the reverse happens at the tail end of a recession. Marketers exercise caution as inventories start depleting, and raise their advertising spending slowly, if at all. And advertising is not just an early indicator. It is also a laggard, tending to recover a full two quarters after the recession officially ends.

Robert J. Coen (2003) on Advertising News finds some interesting results while analyzing the 2001 recession. U.S. advertising spending peaked in December 2000, three months before the recession officially started, and began to grow in May 2002, six months after the start of official

recovery. This article shows that there is a lag between the actual beginning of a recession or expansion period and the advertising total expenditure. It is interesting to see if this behavior is typical across different business cycles. This then begs the question: Do firms sense upcoming slowdown and, thus, reduce their advertising expenses before the slowdown happens?
In other words, does firm behavior regarding advertising expenses predict business cycles?

Data, Hypothesis

We used major databases in constructing our data. We downloaded all the "advertising expenses" and "revenue" data of all the US companies from 1974 to 2013 using the databases, CRSP/Compustat. The original sample consisted of almost 27,000 observations. After preprocessing the data, deleting from the original dataset the outliers (Z-score > 3), and those data records, which presented missing values (in CRSP/Compustat a missing value means that there is no data available) the sample counted around 22,000 observation. We kept the "zero" records under the assumption that is likely that a company invests not every quarter but perhaps annually. We organized this data in an Excel sheet, which showed the quarterly totals of advertising and revenue. Additional calculation was done in order to find the advertising-revenue ratio and the percentage change. Second, we downloaded the quarterly real GDP (base year
2009) figures from the FRED database and calculated the quarterly percentage change.

During the period from 1974 to 2013 there are six recessions according the NBER:

Peak month	***Trough month***
Nov-73	Mar-75
Jan-80	Jul-80
Jul-81	Nov-82
Jul-90	Mar-91
Mar-01	Nov-01
Dec-07	Jun-09

TABLE 1. NBER's Business Cycle Dating Committee, dated 9/20/10

NBER's Business Cycle Dating Committee defines a recession as a significant decline in economic activity across the economy. The definition of economic activity is not fixed but it examines and compares the behavior of various measures of broad activity. The principal ones are: (1) real GDP measured on the product and income sides, (2) economy-wide employment, and (3) real income. The Committee may also include indicators that don't cover the entire economy, such as real sales and the Federal Reserve's index of industrial production (IP), if they play a significant role in the analysis. Third, we assigned to recession a 0 dummy variable and to expansion 1. Using the NBER definition above, we considered expansion if in a given quarter two to three months were indication expansion.

As our literature review indicates, we believe that companies have some expectation of the expansion or contraction just around the corner, and they adjust advertising expenses when the macroeconomic environment requires to have some liquidity available as margin of safety. We thus restate our expectations: Firms have expectation of the upcoming recession or expansion. They reduce or boost their advertising expenses with a certain lag. If the above hypothesis is true, then it is possible to view advertising expenditure as a business cycle predictor.
The graph below shows the pattern of the overall economy advertising expenses-revenue ratio from 1974 to 2013. The blue line represents the average and the orange line represents the standard deviation. In the graph are also highlighted the six recessions.

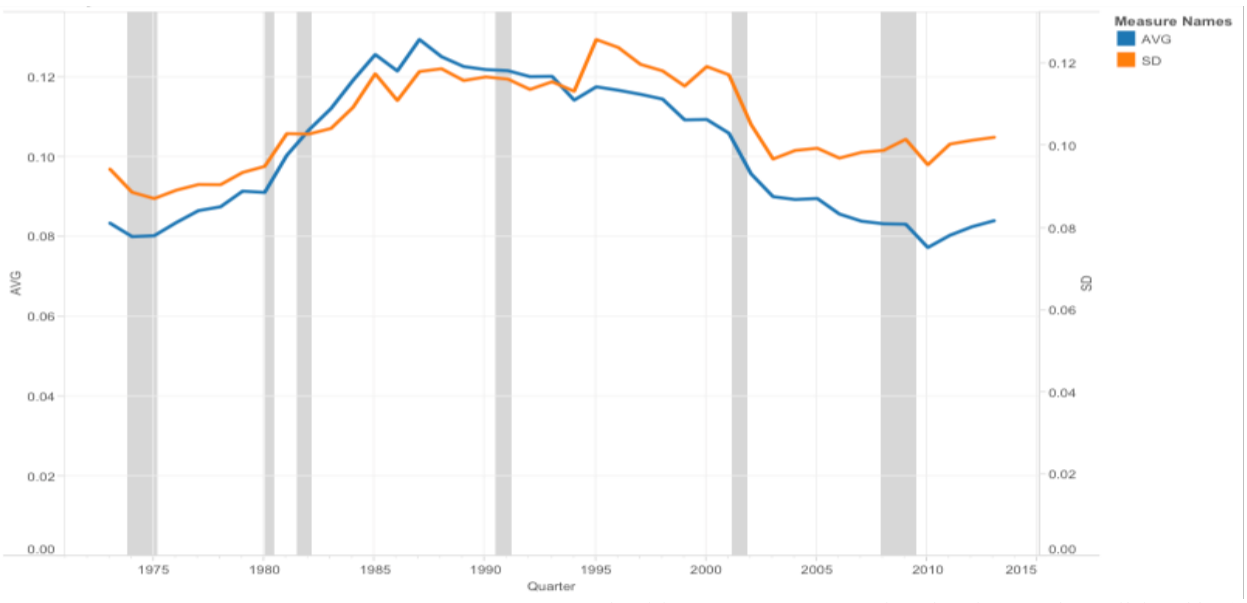


TABLE 2. Advertising Expenses-Revenue ratio and Business Cycles (Built in Tableau).

Models

We built two sets of models (A and B) and conducted some regression tests in order to find if companies manage the overall advertising expenditure before the real beginning of the contraction or expansion period. We try to predict the percentage change in real GDP) using the percentage change in relative advertising expenses using up to three lags. Five sub-models are built:

1a) $\%RGDP_0 = f\,[\%(ADV/REV_0), \%(ADV/REV_{-1}), \%(ADV/REV_{-2}), \%(ADV/REV_{-3})]$

2a) $\%RGDP_0 = f\,[\%(ADV/REV_0]$

3a) $\%RGDP_0 = f\,[\%(ADV/REV_{-1})]$

4a) $\%RGDP_0 = f\,[\%(ADV/REV_{-2})]$

5a) $\%RGDP_0 = f\,[\%(ADV/REV_{-3})]$

The first regression model to predict the real GDP growth (percentage change) includes all the advertising-revenue percentage ratios from three quarters before to the quarter under analysis. After testing the comprehensive model we tested the different components on their own, building four additional models. None of the above models were tested at conventional significance levels of 10, 5, and 1 percent levels. Based on our results (available upon request), we can state that today's real GDP growth is not explained by the growth of relative advertising expenses using current as well as lagged advertising expenditures.

The second set of models incorporate NBER's definition of business cycles. We try to predict the business cycle dummy variable using the advertising-revenue ratio. The dependent variable, business cycle, is a dummy variable assuming 1 if two or more months in a given quarter indicate expansion. We tested this part using the logistic regression with Eviews6. The logistic regression is more accurate in the case of dummy dependent variables. As in the previous part, five sub-models are built and tested:

1b) $DummyGDP_0 = f\,[(ADV/REV_0)]$

2b) $DummyGDP_0 = f\,[(ADV/REV_{-1})]$

3b) $DummyGDP_0 = f\,[(ADV/REV_{-2})]$

4b) $DummyGDP_0 = f\,[(ADV/REV_{-3})]$

5b) $DummyGDP_0 = f\,[(ADV/REV_0), (ADV/REV_{-1}), (ADV/REV_{-2}), (ADV/REV_{-3})]$

Conclusion

Do firms' advertising expenses help us predict business cycles? The results presented in Appendix I in Table I provide *some* statistical evidence that firms respond to potential expansions by boosting their advertising expenditures earlier. By the same token, this would perhaps imply that they, in response to impending recessions, reduce their advertising expenditures. We can explain the business cycle identified by dummy variables with a change in the advertising-revenue ratio. Interestingly, firms seem to reduce (or increase) their advertising expenses before the beginning of a recession (or expansion) period. From a significance perspective, if business cycle is predicted using the advertising expenses of the same quarter, it seems that the significance is not strong as using the advertising expenses of one, two or three quarters before. Therefore, even though firms do respond to the current pressures, it looks as if their responses may be stronger before the event starts. The last model which included all the quarters together, showed no significance. The reason of the non-significance of the comprehensive model seems to be the high correlation amongst the lagged advertising variables (multicollinearity).

We admit there are a number of apparent weaknesses in our models. One can easily argue that— and we do allude to this possibility in our paper—there is a good deal of simultaneity in our models. In other words, it is possible that business cycles are indeed one of the determinants of the firm behavior. Also, the (weak) significance observed in the second set of models perhaps may possibly disappear if all the relevant independent variables are controlled for. Moreover, given that the continuous variables (real GDP) should provide more information than dummybased cycle variables and that the first set of models showed no significance is perhaps another indication of the possibility that the link we find is perhaps based on chance. However, simplistic and weak it may look at the moment, it is hoped that this study will enhance any discussion on the micro-foundations of business cycles. .

Appendix I

Table 1: Regression Results

Model 1.B	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.848907	1.627729	-1.135882	0.2560
ADV	150.9471	65.40425	2.307909	0.0210
McFadden R-squared	0.033856			
Obs with Dep=0	20	Total obs		157
Obs with Dep=1	137			

Model 2.B	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.127788	1.505120	-1.413700	0.1575
ADV1	162.4716	60.20739	2.698532	0.0070
McFadden R-squared	0.039071			
Obs with Dep=0	20	Total obs		157
Obs with Dep=1	137			

Model 3.B	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.003676	1.398155	-1.433085	0.1518
ADV2	157.4795	55.46236	2.839393	0.0045

McFadden R-squared	0.037115		
Obs with Dep=0	20	Total obs	157
Obs with Dep=1	137		

Model 4.B	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.020246	1.384125	-1.459584	0.1444
ADV3	158.2481	54.89243	2.882877	0.0039
McFadden R-squared	0.037629			
Obs with Dep=0	20	Total obs		157
Obs with Dep=1	137			

References

Coen Robert J., (2003) "10 Interesting economic and business cycle facts," *Advertising Age*, Vol. 74 Issue 51, p29.

Dan Avi "Double-Dip Recession? Advertising Stocks Say So", *Forbes*, 9/6/2011.

Ozturan Peren and Ozsomer Peren (2011), "Understanding the Market in Turbulent Times: Advertising during Economic Downturns: Market Orientation and Industry Environment Effect", AMA Summer Educators' Conference Proceedings. 2011, Vol. 22, p61-62. 2p.

Rothenberg Randall (2008), "Not ye olde banners", *Economist* 11/29/2008, Vol. 389 Issue 8608, p65-66.

Steenkamp Jan-Benedict E. M. and Fang Eric (2011), "The Impact of Economic Contractions on the Effectiveness of R&D and Advertising: Evidence from U.S. Companies Spanning Three Decades," *Marketing Science*, Vol. 30, No. 4 (July-August 2011) (pp. 628-645).

Wagner Louis C. (1941), "Advertising and the Business Cycle," *Journal of Marketing,* Vol. 6, No. 2 (pp. 124-135).

ABSTRACTS

Influence of Eco-Labeling and Eco-Claims on Consumer Perceptions of Brand Attitudes and Purchase Intentions

Katelyn Pomfret, Stetson University
Michelle DeMoss, Stetson University

Abstract

One of the more popular branding strategies today involves aligning a brand with positive environmental claims or benefits. Yet does this association positively impact consumers' attitudes and purchase intentions toward the brand? Previous studies have examined how environmental product information can affect a product's price point (Kassarjian 1971) and brand perceptions and purchase intentions (Kinnear & Taylor 1973; Monotoro-Rios, Luque-Martinez, & Rodriguez-Molina 2008) with mixed results. These studies did not distinguish between the level of product involvement (i.e., high or low) or the form in which the environmentally sustainable information was presented (i.e., eco-label vs eco-claim), which may explain the confusion.

Building upon previous studies, this paper examines the impact that eco-claims and eco-labels have on consumers' attitudes for both low and high involvement products using an experimental design. The hypothesis is that eco-labels will have more of an impact on consumer attitudes and purchase intention for low involvement products. Yet for high involvement products, eco-claims will have more of an impact as compared to an eco-label. These predictions are based on the Elaboration Likelihood Model (Petty, Cacioppo, & Schumann1983; Petty and Cacioppo 1984). When processing information about high involvement products, individuals are more likely to use the central route to persuasion and carefully consider the true merits of the information presented. Thus, individuals will be more persuaded about the sustainable features of a high involvement product if the information is presented as a thoroughly explained eco-claim. However, for a low involvement product, individuals are more likely to use the peripheral route to persuasion to process product information. Thus, individuals will be more persuaded about the sustainable features of a low involvement product they are able to make simple inferences about the merits of the product's sustainability or associate positive or negative cues in the stimulus, such as through the use of a eco-label.

A sample of consumers participated in the study to measure their attitudes and intention to purchase a hypothetical product. The low involvement product was laundry detergent made from biodegradable ingredients. The high involvement product was a cell phone made from recycled materials. The sample was split into six conditions: low involvement with label, low involvement with claim, low involvement with neither, high involvement with label, high involvement with claim, and high involvement with neither. The survey displayed a screenshot of a website either

selling the laundry detergent or the cell phone depending on the sample group. Following the screen shot, respondents answered questions to gauge their attitudes and intentions to purchase the product along with an assessment of tendency to engage in environmental behaviors.

The results of the study suggest that environmentally sustainable information (i.e., eco-labels and eco-claims) significantly impacts consumers' brand attitudes and purchase intentions. In addition, eco-labels significantly increased perceptions of a brand's positive environmental impact as compared to eco-claims. However, consumers' brand attitudes and purchase intentions did not differ significantly based on whether the brand contained an eco-claim or an eco-label. Based on the findings, important marketing implications for product branding and package design are discussed.

References

Kassarjian, H. H. "Personality and Consumer Behavior: A Review," *Journal of Marketing Research*, 1971, Vol. 8, 409-418

Kinnear, T.C., and Taylor, J.R. "The Effect of Ecological Concern on Brand Perceptions," *Journal of Marketing Research*, 1973, Vol. 10, 191-198.

Montoro-Rios, F.J., Luque-Martinez, T., and Rodriguez-Molina, M. "How Green Should You Be: Can Environmental Associations Enhance Brand Performance?" *Journal of Advertising Research*, 2008, 547-63.

Petty, R.E., Cacioppo, J.T., and Schumann, D. "Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement," *Journal of Consumer Research*, 1983, Vol. 10, 135-146.

Petty, R.E., and Cacioppo, J.T. "The Effects of Involvement on Responses to Argument Quantity and Quality: Central and Peripheral Routes to Persuasion," *Journal of Personality and Social Psychology*, 1984, Vol. 46, 69-81.

Redesigning the Assessment Process: How one University Optimized and Aligned Assurance of Learning

Jennifer P. Pitts
Fonda Carter
Andres Jauregui

Columbus State University

Abstract:

Recent changes in accreditation guidelines by the Association to Advance Collegiate Schools of Business (AACSB) have many business schools re-evaluating their Assurance of Learning (AOL) initiatives, and developing more streamlined and practical solutions to the assessment process. In this case study, we review one institution's progress following a successful AACSB maintenance visit to see how learning goals, measurement processes, and curriculum mapping are redesigned to be more integrated, aligned, and actionable.

For the past decade, Assurance of Learning activities have focused almost exclusively on direct measures of student outcomes. The process, defined by Palomba and Banta (1999) as a "systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development," requires that program expectations and standards are explicit, and that processes are in place to ensure graduates are meeting the standards. If not, improvements are identified and implemented as part of the "closing the loop" process. The focus on direct measures of assessment and evidence of faculty buy-in have often resulted in an abundance of data being collected but little insight into where changes were needed to improve learning outcomes. Programs easily became cumbersome to manage and lack of faculty participation was frequently identified in the literature as a challenge by many colleges (Martell, 2007). The need to develop a more streamlined and efficient process for collecting, analyzing, and reporting evidence of student achievement was a key goal of this institution's efforts.

In this paper, following the AACSB 2013 Guidelines for Assurance of Learning, we discuss how the assessment process was streamlined to ensure curriculum alignment with program goals and objectives and to facilitate faculty engagement in the process.

References

Martell, K. "Assessing Student Learning: Are Business Schools Making the Grade?" Journal of Education for Business, 2007, Vol. 82, No. 4, pp. 189-195.

Palomba, C.A., and T. W. Banta. (1999). Assessment Essentials. San Francisco, CA., Josey-Bass

Investment Decision Risk Analysis: Preliminary Evidence of the Impact of Accounting Rules' Convergence

Gary G. Johnson, Southeast Missouri State University
Zheng Wu, Southeast Missouri State University

Abstract

This study evaluates the extent to which investment decision risk is impacted when financial information is reported under International Financial Reporting Standards (IFRS) as operationalized in China, Japan, Germany, and France, and the same information reported under U.S. GAAP. Using financial statements from 50 companies headquartered in the world's most productive economies, this study concludes there are no significant differences in leading investment analysis ratios when determined under different accounting rules. High convergence of rules among the different accounting standards appears to account for the low levels of investment decision risk.

Growing Gap: The Case for Nonprofit Leadership Programs

David E. Deviney, Tarleton State University
Lisa Lee, Tarleton State University

Abstract

The nonprofit sector in the United States is large with over one million organizations recognized by the Internal Revenue Service as tax-exempt. As the nonprofit sector continues to grow, they will battle against business and government sectors to find talent to fill leadership positions. By 2016 the nonprofit sector will need 80,000 new senior managers each year due to the growing number of nonprofit organizations, the retirement of Baby Boomers, movement of existing managers within or outside of the organization, and the growth in size of nonprofit organizations. A recent survey by the Nonprofit Leadership Alliance of current non-profit leaders indicated that over half of the respondents did not believe that nonprofit executive and leadership professions are prepared for management and leadership roles. The same survey indicated that 70% of respondents did not believe that entry-level to director-level candidates will be prepared for leadership. This would strongly suggest that colleges and universities have an opportunity to fulfill this need. This paper reviews the competencies needed by non-profit leaders and puts forward a recommended curriculum that will satisfy this growing gap in undergraduate education.

Enterprise Risk Management Guidelines: A analysis and comparison

Elizabeth M Pierce & Douglas Anderson

Saginaw Valley State University

Since the failure of such companies as Enron, there has been a growing emphasis on internal control and assessment of risk. In response to this need for risk assessment and control, two organizations issued guidelines for Enterprise Risk Management (ERM). In 2004, the Committee of Supporting Organizations of the Treadway Commission (COSO) issued their first ERM guidelines. In 2009, the International Standards Organization issued their ISO31000 guidelines, which also addressed the needs of ERM. However, a survey in 2010 by COSO indicated that corporations were not embracing these guidelines. With the meltdown of a number of financial institutions during the recession of 2009, increasing attention is being given to ERM and questions are being raised as to why frameworks such as these did not work to prevent the meltdowns. In 2014, ISO embarked on rewriting their ISO31000 guidelines and in 2015, COSO started the same process. This paper is an attempt to analyze and compare the two guidelines and to highlight their strengths and weaknesses. Finding common ground between the two might allow a more comprehensive and useful set of guidelines for each organization.

Family Socialization and Financial Literacy

LaToya Brown, Florida A& M University
Dr. Yolanda K. H. Bogan, Florida A& M University

Abstract

Families want their children to be able to successfully navigate the social, emotional, and physical demands that life brings. Stable finances provide greater comfort and decreased anxiety, but when does an understanding of finances begin? Parents and teachers would do well to begin teaching children about finances in ways that match the child's cognitive development. In addition to the parents' knowledge and skills in finances, there are other factors that impact disparities in families' financial literacy. This paper provided a review of additional variables that may impact a family's ability to convey knowledge and adaptive skills in finances. The authors highlighted the family socialization model as a framework for teaching financial literacy and introduced family values that foster financial literacy. Finally, the authors provided easily accessible tools that families can use to increase their financial literacy and wealth.

Keywords: financial literacy, parents, family socialization

The Relationship Between Consumer Sentiments and Stock Market, Money Market, Oil Market, Mortgage Market and Real Estate Market

Akash Dania, Ph.D., Alcorn State University

ABSTRACT

Sentiment surveys have recently gained attention in their role in forecasting economic environment. More recently, several studies have employed consumer confidence survey data provided by different sources to examine the effect of investor, business or consumer sentiments on stock market returns. However, much less attention has been allocated to the relevance of linkages between consumer sentiments and broader financial markets. Survey of consumers' attitude gauge how consumers feel about economic environment, and how it may change. In this study, we look into the relationship between consumer attitudes and expectations about the U.S. economy and what impact it has on key financial markets, namely the stock market, money market, oil market, mortgage market and real estate market.

Faith Based Investing: Examining Performance of Investing in Companies Compatible with Religious Values

Akash Dania, Ph.D., Alcorn State University

ABSTRACT

Among the fundamental tenets of generally conventional investment management process is the construction of an efficient frontier, which aims to maximize wealth for a given level of risk. Not all investment processes follow this rule, however, and socially responsible investing (SRI) is one exception to this rule. Catholic Value Index (CVIs), through their compliance with Conference of Catholic Bishops' Socially Responsible Investment Guidelines, differentiates themselves from conventional investments. Indexes reflect religious values to provide an innovative and relevant opportunity set for values-based investors. The indexes include companies that are compatible with religious values. This study examines dynamic linkages between Catholic index returns to their corresponding "conventional" market index returns.

A Qualitative Meta Analysis of Literature on the Dysfunctional and/or Disruptive Factors Related to IFRS Adoption Around the World

Noema "Amy" Santos, State College of Florida
William C. Quilliam, Florida Southern College

Abstract

This study uses a modified form of qualitative meta analysis in order to develop a framework that will help determine whether IFRS adoption in a country will be successful and why. Dysfunctional aspects and/or disruptive factors will also be compared to results of a study on the proposed adoption of IFRS in the United States in order to find common themes and support for its findings. This study could be useful for organizations and professionals in various countries which have not adopted IFRS. It can also be used by college-level professors and students to increase their understanding of IFRS implementation. This study has also determined whether the literature contains information on IFRS implementation to develop the proposed framework.

The Effect of Financial Statement Restatements on the Stock Market

Iuliia Chepurko, PhD

University of Alaska Anchorage

Abstract

In this project, we explore effects of financial statement restatements on the market by examining abnormal returns before and after the date of the announcement in a window [-5; +5]. We test and confirm the hypothesis that the announcement of a financial restatement leads to negative cumulative average abnormal returns in a window [-5; +5] around the announcement date of restatements from 1997 to 2012. We also look at the influence of different restatement reasons on cumulative abnormal return to identify reasons which cause the most significant changes in a stock price. We check if revenue recognition reasons cause the highest negative change in cumulative abnormal returns in a window [-1; 0; +1]. We also examine what leads to positive cumulated average returns in a window [-1; 0; +1]. Regression analysis reveals that the highest negative response on restatements was caused by revenue recognition issues in a selected window. The same is in effect when taking into account only positive CARs and only negative CARs in a window [-1; 0; +1].