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PROPOSED ATTESTATION GUIDANCE: Appropriate or Not?

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ABSTRACT

The PCAOB has proposed audit firm rotation and the identification of the engagement partner be part of the audit report. The PCAOB claims these requirements will enhance audit quality due to increased auditor accountability, improved skepticism and transparency. This paper examines the advantages and disadvantages of these proposals to determine the merits and whether the guidance is appropriate for US publicly traded firms. In addition, other concerns resulting from the proposed guidance are presented. The discussion concludes audit firm rotation and auditor signature, firm transparency and skepticism is a concern. The discussion also concludes appropriate auditor/client relationships based on different attestation guidance in different parts of the world must be approached carefully to avoid misinterpretation or cause more harm than good.

INTRODUCTION

Within the past decade auditing and reporting guidance has been continually evolving and expanding. These changes are attributed, in part, to accounting scandals such as Enron and WorldCom. These scandals shed light on the lax quality of past audits due to a number of factors including executive unethical behavior, nonfunctioning internal controls, manipulating financial information for personal gain, and lack of independence among auditors, analysts and regulators (Cullinan 2004; Ball 2009; Giroux 2008). In response to the scandals, the US Congress (2002) passed the Sarbanes-Oxley Act (SOX). The Act created the Public Company Accounting Oversight Board (PCAOB) supervised by the Securities and Exchange Commission (SEC) (Arens et al. 2012). PCAOB is proposing new auditing guidance including mandatory auditor rotation and audit report signatures to increase transparency information, accountability, and audit quality for publicly traded companies.

Proponents of mandatory auditor rotation argue rotation would do away with conflict of interest and impaired auditor objectivity with long-standing client relationships and familiarity (Healy & Yu-Jin 2003, 10; Cohn 2012). Some believe there are more benefits, such as increased auditor skepticism rather than costs and higher audit fees, associated with the mandatory rotation (Daugherty et al. 2011). Upon disclosure, the PCAOB mandatory rotation proposal received 659 comments with an overwhelming majority opposed to the implementation (Daugherty et al. 2011). Thus the advantages and disadvantages of mandatory auditor rotation warrant discussion.

The PCAOB proposal to require an auditor to affix his or her signature to the audit report is designed to enhance accountability and transparency. It, too, is controversial as the requirement could minimize the firm's accountability while conceivably increasing the partner's liability. A recent study (Carcello & Li 2013) finds the signature requirement adopted in the UK reinforces the ownership of the audit report and improves audit quality by decreasing abnormal accruals, reducing management endeavors to meet earnings targets, and reducing the issuance of qualified audit reports.

These PCAOB auditing and reporting guidance proposals should enhance auditor independence and objectivity given the universal belief that independence, integrity, objectivity, and professional skepticism are among the most important qualities auditors must possess and maintain. Controversy exists regarding the standard-setters proposals concerning auditor rotation and audit report signatures. Yet, each proposal had advantages and disadvantages. The following analysis of the arguments and supporting data concludes the United States (US) should maintain its present auditor rotation standards and proceed with partner signature or identification.

AUDITOR ROTATION

US auditor rotation standards are fairly specific and stringent (Mihaela et al. 2011, 574). According to the relevant section of SEC Regulation S-X, auditors are no longer independent when they act as lead partner or concurring partner for more than five consecutive years (SEC 2001, 247-248). Once the auditor's five year term expires, they are not allowed to return to the prior position for an additional five years. According to SOX, the guidance also requires rotation of the lead, coordinating, or reviewing partner after five years, although the Act does not specify how long an audit partner must wait before he or she can return to the client (SEC 2001, 247, 249; US 107th Congress 2002, 773). Before SOX, the limit was seven years for a lead audit partner with a two-year hiatus before returning to the client (US 107th Congress 2002, 745; Arens et al. 2012, 4; SEC 2011, 2). Thus in accordance with SOX and SEC guidance, the most prominent audit positions are already being rotated in the US.

SEC Regulation S-X has a limit of seven years for other audit engagement team partners who provide more than ten hours of audit, review, or attest services in connection with the annual or interim consolidated financial statements of the issuer or a lead partner in auditing a subsidiary with at least 20 percent of the consolidated entity's revenues or assets (SEC 2001, 247). After the seven-year restriction, an auditor is not allowed to return to those services for two years (SEC 2001, 247).

The SEC provides an exception to Regulation S-X's strict rule. A firm with fewer than ten partners and fewer than five audit clients does not need to rotate partners if the PCAOB reviews the engagements that would otherwise violate the rotation rule no less than once every three years (SEC 2001, 247). This is a concession to small firms for which rotation would cause undue hardship. Presently, the US requires internal audit manager rotation only; it does not require rotation of the audit firm (Mihaela et al. 2011, 576).

Partner Rotation

In their comparison of US, European Union (EU), and international rotation standards, Mihaela et al. (2011) include an extensive list of the advantages and disadvantages

of audit partner rotation. Rotation makes it less likely the audit partner will expect similar results to previous years when the client has in fact undergone changes. New auditors do not have the same level of trust in the client's management and therefore have greater professional skepticism. New auditors are also more likely to bring fresh approaches to the audit. Switching auditors makes it harder for clients to predict and counter audit procedures. Audit partner rotation makes the field more competitive, which should improve the quality of the work performance. Mihaela et al. (2011) point out auditors might become more diligent when forced to rotate since others will see their work. The main purpose of audit partner rotation however, is to keep auditors independent and objective by keeping them from becoming too familiar with their clients. An Australian study (Monroe & Hossain 2013) finds using the same auditor beyond seven years make a going-concern disclosure much less likely which supports partner rotation. Yet when audit partner rotation is in place, a going concern disclosure is far more likely (Mihaela et al. 2011, 575; Monroe & Hossain 2013, 265). On the whole, Mihaela et al. (2011) details several advantages to the current system of partner rotation while identifying disadvantages.

The most obvious disadvantage of audit partner rotation is new auditors do not have the same wealth of experience and insight into the firm's workings as the former auditors. This unfamiliarity can lead to the auditor missing some of the firm's mistakes or omissions. The new auditor must rely more heavily on the client for information. There can be little, if any, long-term planning with engagements requiring rotation. Inherent limitations on the amount of auditing that can be done could mean that some areas are obscure to the new auditor. There is less reason when rotation is required for auditors to put resources into client-related services, since the rotation will render those investments less useful. Lastly, there are limits on how competitive auditing may become due to rotation as it impacts the profits auditors can achieve with efficiency (Mihaela et al. 2011, 575).

Mihaela et al. (2011, 575) find the first audit is less efficient than the later ones, which are less expensive than the first audit. Other studies using Taiwanese data (Chi 2011, 270; Chi et al. 2009, 359) did not discover any indication that partner rotation improves audit quality. Monroe and Hossain (2013, 265) find longer tenure leads to better quality as determined by discretionary accruals, at least for small companies. While some researchers believe it takes an auditor two or three years to really learn how to audit a specific client effectively (Daugherty et al. 2011, 60). Partner rotation is clearly not without its flaws.

Firm Rotation

Two studies (Catanach & Walker 1999, 53; Chi 2011, 268) find long-term dealings with clients cause auditors Accounting literature is focused more on external audito become less inventive with their procedures and less tor rotation. That is, the literature addresses changing acprofessionally skeptical. Auditors being involved with the counting firms entirely rather than just the audit partner same client for a long time influence whether a going conwithin the audit firm. It is difficult to discover who the cern problem is disclosed. These findings are not as comengagement partner is and when, or if, they change, thus pelling as those reporting audit failures increases after five little research is available in the area of audit partner rotayears (Mihaela et al. 2011), but they do support the case tion (Monroe & Hossain 2013, 265). for audit firm rotation.

As a result of a SOX study, the PCAOB concept release There are a multitude of criticisms of mandatory audit firm rotation. Firm rotation only magnifies the loss of experience and knowledge of the inner workings of a company. Clients must spend more time and resources finding a new audit firm and acquainting them with the workings of the firm, not to mention the potential for increased audit fees to cover the auditor's increased cost. Audit firm rotation means that each firm will work with a client for a limited number of years, which might prohibit them from obtaining a complete picture of the client's status. Audit firm rotation discourages firms from specialization in a particular industry which could lower audit quality if firms only have superficial expertise. There is the potential for less competition due to higher costs, but the Cohen Commission (AICPA 1978) finds there could be too much competition when clients have a hard time discerning audit quality among firms. Competition may lead to lower fees, resulting from cost-cutting measures that decrease audit quality. It is hard to determine how audit firm rotation might impact US firms. However in Italy, there is more competition, but in Spain there is less (Catanach & Walker 1999, 45). Even though the impact is uncertain, strong reasons exist to be cautious regarding audit firm rotation requirements.

issued October 2011 calls for comments as to whether the PCAOB should require firm rotation. During the deliberation, a 2013 House of Representatives alteration to SOX, approved by an overwhelming majority, prohibits the PCAOB requiring firm rotation (Whitehouse 2013). The law is currently awaiting Senate approval (Chi 2011, 266; Tysiac 2013a, 8). Even with the House of Representatives' action, the PCAOB has not removed auditor rotation from its agenda. Meanwhile the EU took another step toward mandatory audit firm rotation in December 2013 as member states approved new audit regulation (Tysiac 2013b). The new rules are an attempt to strengthen the independence of auditors as well as enhancing diversity. There are many arguments for firm rotation. Auditors who have been part of the client engagement for many years are often described as complacent and lax (Lu & Sivaramakrishnan 2009, 71). New auditors bring new or different ideas and opinions to the engagement. Lu and Sivaramakrishnan (2009) report conservative auditors tend to be replaced by aggressive ones and vice versa, which confirms that rotation brings in new viewpoints (72-73). External audit firm rotation addresses concerns about overfamil-Mandatory audit firm rotation is confounded by compaiarity and auditor adherence to inappropriate procedures nies doing business in multiple countries. Since most ineven more than partner rotation.

ternational companies rely on the Big Four audit firms, Those who support audit firm rotation point to studies little discretion is available for an audit firm when rotathat find audits losing quality the longer a firm serves a tion is necessary, especially if one or more of the firms are client. Catanach and Walker (1999, 48) find audit failures unable to handle the engagement. Hollein (2012) raises are more likely to occur in the first year or after the fifth the question of large transactions in-progress and the loss year. It is hard to attribute the post-fifth-year failures soleof knowledge about those transactions (61) when the firm ly to familiarity, but there is at least one obvious case i.e., must switch audit firms. Firm rotation is not a simple so-Deloitte, Haskins & Sells and AWA Ltd. where the audit lution to the familiarity problem. partner deliberately concealed accounting problems to Catanach and Walker (1999, 62) find more audit failures protect friends in management. Audit firm rotation also after five years with a client, while Chi (2011, 270) finds carries the benefit that gray areas such as intangibles have auditor ability increases with longer client association. several experts auditing them. Audit firm rotation takes An American Institute of Certified Public Accountants away the ability of clients to coerce auditors by threaten-(AICPA) (1992) investigation of lawsuits from 1979 to ing to curtail relations if the firm does not grant a favor-1991 reports audit failures have triple the probability of able opinion (Catanach & Walker 1999, 48; Mihaela et occurring in the first couple of years a firm works with a al. 2011, 575). Identifying accounting problems and the client. These findings both support and refute the adopremoval of client pressure make a compelling case for firm tion of audit firm rotation. rotation.

obscures opinion shopping as investors are less likely to ascertain a firm changed auditors to get a better report. This promotes less informed investment decisions. Lu and Sivaramakrishnan (2009) posit auditor rotation takes the sting out of an audit committee's ability to get rid of bad auditors, which reduces the incentive for quality work. They also conclude when opinion shopping is possible, mandatory firm rotation is both beneficial and detrimental, depending on the circumstances of the company and whether the former auditor was aggressive or conservative. If the former auditor was aggressive, changing audit firm tends to make a company doing well to issue worse financial statements in terms of investment efficiency and a company not doing so well to issue better statements (Lu & Sivaramakrishnan 2009, 85). The reverse is true when the former auditor is conservative (Lu & Sivaramakrishnan 2009, 73). The ability to change auditors further complicates the matter of audit firm rotation.

Mandatory firm rotation may be unnecessary. The AIC-PA notes there are already good reasons for an auditor to stay independent and objective, not the least of which is their standing in the business community (AICPA 1992). Partner rotation and peer reviews already serve much of the purpose for which one would propose audit firm and auditor rotation. That is, an auditor who misbehaves always has the threat of being sued and audit firms always have the threat of losing clients. Catanach and Walker (1999, 54) report auditor independence is compromised when the auditor and the firm do not have a consensus about something the client intends to report and the matter in question lasts for more than one reporting period. The costs of firm rotation may not be justified if firm rotation is redundant.

Chi (2011) finds firm rotation unnecessary and costly when considering the existence of audit committees under SOX guidance. Audit committees must ensure auditor independence. In the event audit firm rotation is added to the process, the audit committee can spend more time and resources on monitoring costs to prevent collusion between the manager and the auditor (Chi 2011, 267). Firm rotation removes a reason for auditors to display a professional behavior by forcing them to lose the client whether they engage in collusion or not (Chi 2011, 266). Though not a part of the current literature, these factors add to the argument against firm rotation.

Mandatory audit firm rotation is not particularly successful where it has been tried. Italy sees no end to its scandals after adopting audit firm rotation. Israel chose not to closely enforce its rules from the 1970s requiring government companies to rotate firms after three years. Spain, Canada, and Austria have repealed their firm rotation

Audit firm rotation resulting in an audit firm change laws. One reasons for discontinuing audit firm rotation is the excessive costs versus the small benefit (Catanach & Walker 1999, 47; Harris & Whisenant 2012, 7). Historical international experience does not indicate firm rotation is desirable or beneficial.

Should the US Implement Rotation?

Weighing the costs and benefits of audit firm rotation, it appears audit partners should be rotated, but not the firm. The US should avoid the experience of Canada, Austria, and Spain and abstain from audit firm rotation. Conversely, in deciding audit partner rotation and whether the US model of a five-year maximum with a five-year cooling-off period as an optimal criteria, the AICPA (1992) and Catanach and Walker (1999) studies provide an indication of the benefits of audit partner rotation. Unfortunately, the results of the two studies point in opposite directions. If audit failures are more common in the first year or after the fifth year (Catanach & Walker 1999, 48), then the U S internal auditor guidance is appropriate. However, if audit failures have a triple probability of occurring in the first two years of working with a client (Catanach & Walker, 1999, 62), then US audit standard setters should consider allowing audit partners to work longer with clients. In the event audit firm rotation becomes US audit guidance, the identification of the audit manager via his or her signature rather than just the firm's name would advance transparency and information validity.

AUDIT REPORT SIGNATURE

The PCAOB (2010) signature standard, based on AIC-PA 1989 rules, requires the audit report to contain the manual or printed signature of the auditor firm $(1, 3, 3\emptyset)$. The PCAOB is considering some form of additional accountability. It currently allows the audit partner to sign the report if he or she elects to sign the audit report. In 2009 the PCAOB issued a concept paper proposing a requirement of the audit partner signature in addition to the firm's name (2,4), based on a recommendation of the Advisory Committee on the Auditing Profession (ACAP). The comment letters, primarily submitted by accountants, were critical of the proposal. Only four of the 23 comment letters supported the signature requirement. In 2011, the PCAOB issued a new proposal ignoring the partner signature but instead requiring the identification of the managing audit partner in the audit report (King et al. 2012, 537-538). In 2013, the PCAOB modified their 2011 proposal retaining the rule of identifying of the engagement partner (Rapoport 2013, C3). The PCAOB intends to vote on the matter in the spring or summer of 2014.

A lot of research has focused on the merits and drawbacks of partner signature. The issue is popular with investors wanting to know who audited the financial statements (King et al. 2012, 546, 553). According to the ACAP report (2008, VII:19) requiring a partner signature will increase accountability, transparency, and audit quality, hopefully without increasing the partner's liability (PCAOB 2009, 4). Proponents believe that a partner signature has a psychological impact on the auditor to be more thorough and to carry out better engagement procedures. Several studies (DeZoort et al. 2006; Kennedy 1993) document an increase in accountability leads to a decrease in auditor bias. The PCAOB claims partner identification would provide the same effect on accountability as a partner signature (Carcello & Li 2013, 1516; Bailey et al. 2010).

Investors predict numerous benefits if the US adopts partner signature or identification. King et al. (2012) concur with the PCAOB's argument that audit partner identifi-Most significantly, Carcello and Li's (2013) study of Britcation will let investors watch the partner's work and come ish audits before and after Britain adopted its partner to conclusions about its quality. This would encourage signature requirement report four indications of better firms to maintain the highest quality standards, promote audits under the signature rule. There are far fewer abnorcompetition among partners, and cause audit committees mal accruals, small earnings increase[s] are 12% less comto pay more for better audit partners. King et al. (2012) mon, market return and return on assets are more closely identifies improvements the PCAOB 2011 proposed siglinked, and auditors issue 3.9% more qualified opinions nature could achieve such as collective responsibility will (Carcello & Li 2013, 1528). They attribute the control on be apparent to investors. The identification of partners earnings management and the more frequent qualified aumight prove just as beneficial as a signature requirement. dit opinions to superior collection of evidence. Increased Others, however, feel that the PCAOB's new proposal of conservatism could also account for the decrease in abnoridentifying the partner will not increase accountability as mal accruals, the increase in qualifications, and the limit much as a partner signature (King et al. 2012, 538; Auditon earnings management. The market response to the ing Standards Committee 2009, C12). Either way, both change is a positive improvement. Carcello and Li (2013) proposals provide improvements and minimize investor compare the British and European firms with partnership liabilities. signature requirements to US firms without partner signatures and conclude the improvements are indeed due to The ACAP report (2008) states that the signature requireaudit partner signature adoption. Other studies (Messier & Quilliam 1992; Tan & Kao 1999) find heighten accountability causes auditors to use more cognitive prosufficient abilities. Thus the Carcello and Li (2013) study partner signature.

ment should not impose on any signing partner any duties, obligations or liability that are greater than the duties, obligations and liability imposed on such person as a member cessing and to improve their performance when they have of an auditing firm (VII:20). Such an arrangement might be feasible since the same terminology is used as a SEC provides evidence of the benefits investors expect from safe harbor in Regulation S-K protecting financial experts on the audit committee from additional liability by being the designated financial experts. The SEC, PCAOB, or an ordinary citizen can hold auditors liable, so a signature Disadvantages may not involve a liability increase. The PCAOB (2009) Bailey et al. (2010) report many believe the firm's signadoes admit, however, that some jurisdictions do not hold ture is better than the partner's as the firm's signature a partner liable for misstatements under the Securities more closely reflects the collective responsibility under-Exchange Act of 1934 if they did not sign the report, so lying the audit report. They point out that audit parta liability increase possibility exists. Bailey et al. (2010)ners might be reluctant to put their colleagues at risk by investigates the number of cases against financial experts conducting a poor audit to which the entire firm puts its of audit committees and find only three state-level cases,

none of the rulings were against the financial expert. It may be possible for the PCAOB to create an effective safe harbor for audit partners as well (PCAOB 2009, 11-12; Bailey et al. 2010, 339).

Those who support audit partner signatures compare them to the signatures of the chief financial officer (CFO) and chief executive officer (CEO) on the firm's annual financial report to certify the report's correctness and thoroughness. According to an SEC Commissioner, the CFO and CEO certification requirement has led to a positive impact on financial reporting (ACAP 2008, VII:19). Glassman (2006, 2) reports the rule also led to more conservative financial statements through less earnings management that augmented income and loss recognition. One executive who was required to sign his financial statements commented, 'It is psychologically different' (PCAOB 2009, 6). If the comparison is valid, it would increase justification for partner identification or signature.

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name. A firm signature also better portrays auditing reality wherein audit partners commonly contact the national office or others outside the daily audit work. Since the client's audit committee knows who the audit partner is, it is felt that investors do not need to know. An observer criticized the signature proposal because big multinational audits can involve a multitude of partners from various locations (PCAOB 2009, 10; ACAP 2008, VII:20). However, there are sound reasons for retaining a firm signature on the report.

Audit partner signatures lead to increased costs. Carcello and Li (2013) report a 13.2% increase in audit fees after Britain adopted its signature rule. This could have been due to increased auditor caution leading to engagement longer hours. If the additional work were supererogatory, it would represent inefficiency. They declined to give a definitive opinion as to whether the increases in audit quality were worth the extra cost. Bailey et al. $(2\emptyset 1\emptyset)$ note SOX brought additional costs to the audit that clients had to bear and predict an identification requirement could do the same. The Big Four accounting firms suggest identifying the audit partner will not result in higher liability or increase litigation costs (Carcello & Li 2013, 1542; Bailey et al. 2010, 340). Additional audit fees are the trade-off that comes with audit partner signature.

Applying Britain's experience with partner signature to the US might not be appropriate. Carcello and Li (2013, 1517) point out that a US auditor is exposed to bigger risks from lawsuits than a British auditor because Britain does not have class action lawsuits or contingent fees and requires the lawsuit loser to pay all legal costs. Thus US firms may see bigger legal costs than Britain firms with a partner signature requirement. Carcello and Li (2013) also posit that the US's legal environment might mean a signature requirement would cause US auditors to work even harder than British ones (p. 1517). Whether the benefits to US firms would outweigh the costs is an open question.

Some believe present control measures are adequate (Bailey et al. 2010, 338). Carcello and Li (2013) list the many controls that already exist to encourage diligence in audit partners including internal firm quality-control inspections, PCAOB inspections, potential SEC and PCAOB enforcement actions, and civil litigation (1518). The results of PCAOB inspections are not particularly promising as problem areas are a growing trend (Carcello & Li 2013, 1518). Whether existing quality controls are adequate is also an open question.

King et al. (2012) warns investors may pay more attention to the partner than to the financial statements when making decisions. Bailey et al. (2010) notes that one investor opposed the PCAOB's measure because the partner's

reputation could negatively affect the client. The Auditing Standards Committee (2009, C13) notes that investors could make incorrect assessments about an auditor's quality because audit partners do not usually handle a large number of audits. It also points out reputational risks might cause partners to avoid riskier companies who actually need their expertise. Putting an audit partner's name out for all to see and form conclusions might not be the best alternative.

King et al. (2012) outlines the objections to the PCAOB concept release. The objections include transparency will actually be impaired when investors do not get a clear picture of how tasks have been distributed in an audit, corporate governance can be hindered, and administrative complications introduced. Another problem is an esprit de corps break down if the audit partner alone is held responsible, and the partner pays less attention to what other team members observations. They note that greater accountability may not be as helpful when the audit partner does not have the requisite knowledge. Even if partners put more time and effort into an audit, they cannot alter the depth of testing, and some biases like the dilution effect can remain even if the auditor tries to be conservative (King et al. 2012, 545-546). Audit partner signature or identification may not solve all problems and may very well create new ones. On the whole, King et al. (2012) find the evidence lacking and inconclusive as to whether signature requirements improve audit quality (552-554). Bailey et al. (2010) and the Auditing Standards Committee (2009, C11) came to a similar conclusion.

Guidance Decision

Convincing evidence is lacking as to whether or not a partner signature improves audit quality. Carcello and Li (2013) present extensive evidence, but find quality and costs increasing by approximately the same amount. Perhaps that indicates partner signature benefits and costs cancel out each other and the net benefit is or close to zero. It is very possible that Carcello and Li's (2013) findings apply equally to partner identification because of the similar effects on the partner's accountability concern. Meanwhile, Bailey et al. (2010) report identifying financial experts in the audit committee did not really lead to increased liability, so fears of more litigation against auditors could be overblown. When costs and benefits net to zero and litigation risk is close to zero as well, the PCAOB should adopt a partner signature or identification requirement in the spirit of enhancing transparency and accountability.

CONCLUSION

The auditing guidance of the PCAOB and the SEC on auditor rotation and report signature has both proponents and detractors. Some would like to see the US adopt audit firm rotation. Past international experience indicates the PCAOB should avoid firm rotation, which it may legislatively be required to drop and retain partner rotation. The five-years-on, five-years-off approach is the better solution. Meanwhile, the PCAOB is considering, if not partner signature, at least partner identification. Since partner signature is found to increase costs to the firm and benefits to investors in fairly equal measures and evidence suggests that liability would not increase, the US can afford to adopt partner identification as a means of accountability.

As the PCAOB continues deliberating audit firm rotation and auditor signature guidance, firm transparency and skepticism continue to be a concern. Regulators must try to figure out the appropriate client relationships and the relationships of different standards in different parts of the world so attestation reports are not misinterpreted so as to create more harm than good.

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Deception in Financial Graph Presentation: A Behavioral Test of Influences

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ABSTRACT

Our study examines the use of graphs in Impression Management. A survey instrument is used to empirically test the question of whether graphs of quarterly financial information intentionally prepared with a high "Lie Factor" (Tufte 1983) can influence a user's prediction of a revenue number for the next period. The study also tests for the influence of the "anchoring and adjustment" heuristic (Tversky and Kahneman 1974) on a user's prediction. The study results indicate an influence from each in certain cases.

INTRODUCTION

Financial statement information may be disclosed in a variety of ways, e.g., financial statements, notes, management discussion and analysis, and other forms of disclosure. One of the other forms commonly used for presentation is the use of graphs. As Steinbart (1989) points out "When properly constructed, such graphs highlight and clarify significant trends in the data. Improperly constructed graphs, however, distort the trends and can mislead the reader." Such intentionally distorted graphs are examples of what can be described as Disclosure Management or Impression Management (Arunachalam, et. al. 2002). Other accounting researchers have also considered the problems associated with the presentation of financial information in graph form. Beattie and Jones (1992) outlined a theoretical framework for the study of the use and abuse of graphs. They later conducted a behavioral study (Beattie and Jones 2002) examining graph abuse as used in disclosure management. One measure of the extent of distortion present in a graph is the "Lie Factor", first described by Tufte (1983). The first purpose of the current study is to conduct a behavioral experiment to investigate the degree to which graphs prepared with a high Lie Factor can influence the predictions of the users of

the graphs. The second purpose of the study is to evaluate the degree to which information supplied along with the graph can serve as an "anchor" (Tversky and Kahneman 1974) and exert an influence on a user's prediction.

LITERATURE REVIEW AND HYPOTHESES

In the accounting area, one of the earliest papers to address the issue of misleading graphs was by Taylor and Anderson (1986). In their paper they discussed evaluation of graphs using the "Lie Factor" first proposed by Tufte (1983). The original Tufte formula for computing the factor is:

- Lie Factor = (A/B), where
- A = percentage change depicted in the graph, and
- B = percentage change in the actual data.

For example, the percentage change depicted in a vertical bar graph of financial information can be calculated by measuring the height in centimeters of both the shortest bar and the tallest bar and then calculating the percentage increase between the two. The actual dollar change can also be computed and converted into a percentage, and then both computed percentages can be inserted into the

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Lie Factor formula. A graph that is consistent with the actual data would have a computed Lie Factor of 1.00. A financial data series with an actual increase of 50% which is visually depicted in a graph showing a 200% increase would have a calculated Lie Factor of 4.00. In their paper Taylor and Anderson adapt the Tufte formula to the financial reporting context and call their computed factor the Graph Inconsistency Coefficient.

Steinbart (1989) addressed the use of misleading graphs in accounting disclosures and the auditor's responsibility in judging the degree of distortion. He examined a sample of graphical annual report disclosures by firms and found distortions to be present. He too adapts Tufte's formula and calls his evaluative statistic the Graph Discrepancy Index. Both the Graph Inconsistency Coefficient and Graph Discrepancy Index are computed in the same manner. Both are simply the computation of Tufte's Lie Factor, followed by the added step of subtracting the number "1.00" from the calculated factor. Thus, the distinction between the Coefficient or Index and the Lie Factor is the value computed when there is no distortion present. That computed value is 1.00 for the Lie Factor, indication a one-to-one correspondence between the change in the actual data and the graphical presentation change depicted. When using either the Coefficient or the Index, if no distortion is present, then the computed value is 0.00, indicating zero degree of distortion is present. The real difference seems to be that the word "lie" as a descriptive term is much more inflammatory than the more neutral terms "inconsistency" or "discrepancy." In his paper Steinbart calls for controlled experiments on graph user perception to determine how large the graph distortion must be before it begins to influence the user. Our paper answers that call by conducting a controlled behavioral experiment which tests for influence on user predictions.

Beattie and Jones (1992) outlined a theoretical framework for the study of the use and abuse of graphs. They then examined the annual report disclosures of a sample of firms and found graphical distortion to be present. The distortion present was calculated using the Graph Discrepancy Index. Ten years later they revisited the topic in a paper (Beattie and Jones 2002) which again examined a sample of firm annual reports and found graphical distortion still to be present. The paper also included a behavioral experiment where subjects were asked for a perceptual analysis of the rate of change being portrayed in a set of graphs. The graphs in the experiment were presented with no Y axis shown and no axis labels present. The subjects were then asked to use a five point ordinal scale to indicate their judgment regarding the rate of increase portrayed, e.g., "slightly increasing" or "sharply increas-

ing." Subjects in the study were found to be influenced by distortions in graphs with a high lie factor.

The purpose of our paper is to extend the Beattie and Jones experiment by presenting subjects with graphs which do have a Y axis and do have axis labels. Thus subjects will have actual financial trend numbers available and can then be asked to predict what the next number in the series is most likely to be. The distortion present in the graphs will be measured using Tufte's Lie Factor, and the influence of the Lie Factor on the subject predictions can then be examined.

Also examined is the question of whether subject predictions would exhibit evidence of the use of the "anchoring and adjustment" heuristic, first proposed by Tversky and Kahneman (1974). In an accounting context this occurs when users are given the prior year value of a number to be predicted for the current year. In such cases users may tend to "anchor" on the prior number initially and then adjust any prediction from that starting point. In this study, giving the subject last year's actual number provides the subject with a potential anchor from which to start in formulating a prediction for the current year number.

The final question of interest in our study was whether there would be detectible differences in the predictions between genders. The formal hypotheses to be tested in this behavioral experiment, stated in the alternate, are as follows:

- Ha1: User predictions are influenced by graphs containing a high Lie Factor.
- Ha2: User predictions are influenced when an anchor value is included with the graph.
- Ha3: There are differences in graph user predictions between genders.

SURVEY INSTRUMENT

A survey instrument was prepared which consisted of six graphs. Each graph in the survey presented time series revenue data for twelve weekly reporting periods in the first quarter of the year. The instrument asked the subject to use that quarterly data series to predict a value for the first week of the second quarter, i.e., the thirteenth week. The data for each of the series were presented in line graph form only. Potential threats to validity were addressed in the preparation of the survey instrument. The issue of Order Effect was addressed by creating multiple version of the survey instrument in which the presentation order of the six graphs was randomly varied. The researcher who constructed the survey did not teach any of the classes which participated in the survey, thus Demand Effect was unlikely to be an issue in this study. The survey was pilot tested in a summer school course and those results were used to improve the clarity of the instructions in the survey. Those instructions were worded in a neutral manner in order to reduce the potential for a Demand Effect.

Citing Cleveland and McGill (1987), Beattie and Jones (2002) narrowed the focus of their experiment to graphs with increasing trends. Our study, in contrast, extends the Beattie and Jones research by using graphs with decreasing trends. The construction of our survey graphs began with a twelve week linear base series. This base series begins at 155 and decreases in uniform increments of 5 for each week during the quarter, ending at 100. A set values 0, 1, 2, 3, 4, and 5, with both a positive and negative value of each. These twelve noise values were placed with each value in the base linear trend, resulting in a realistic looking declining quarterly trend line. The 12 elamount series that would result in a realistic looking graph of a quarterly revenue trend.

The Lie Factor for each chart in the survey instrument of twelve "noise" values was also created. It consists of the was computed. The computation began by measuring the decrease between the high and low values presented on the chart, measured in centimeters. The actual decrease in random order and then one noise value was combined in the data was also computed. Both these decreases were then converted into percentages and 9inserted into Tufte's formula to compute the Lie Factor present in each ements in this new noisy trend line were then multiplied graph. Selected graphs were also presented with an "anby a constant factor, e.g., 287, to produce a revenue dollar chor", i.e., subjects were also told the value of the Week 13 revenue number from the prior year. Presented in random order within each survey instrument were two sets of graphs, each containing three different graph types. In Random ordering of the 12 noise values and then multi-Set One, the Graph Type 1 was prepared and presented plication by a different constant factor were performed with only a Lie Factor of approximately 4.0. Graph Type six times, thus producing six different series for display in 2 was also distorted by a Lie Factor of approximately 4.0 quarterly revenue graphs. Although all six graphs appear but, in addition, was presented with an Anchor which to be representing 12-week trends in widely differing was 15% higher than the best prediction value. Graph dollar amounts, they are actually simply noisy variations Type 3 had a lie Factor of 4.0 and presented an Anchor which was 15% lower than the best prediction value. Set Two used the same three graph types with the Lie Factor FIGURE 1 increased to approximately 12.0. The graph presented WEEKLY REVENUE in Figure 1 has a Lie Factor of approximately 12.0. If the survey page on which Figure 1 was presented also includ-70000 ed the note "Last year's Week 13 revenue was \$43,128" then the graph was being presented with a High Anchor. The actual survey instrument used in the experiment presented one graph per page and, importantly, presented 60000 the six graphs in random order. To summarize the graph types used:



of the same original linear base series. A least-squares regression on the 12 values portrayed in each chard would produce a straight line which, converted into base terms, starts at 155 and ends at 100. Thus, the best prediction value for Week 13 would simply be a 5-unit linear extension of the Week 12 value of 100, producing a prediction of 95. Since all six data series are really the same noisy base linear trend then, ceteris paribus, the predictions for each of the graphs, after being converted back into base terms, would be expected to be the same. If the subject predictions, in base terms, are significantly different from 95, or significantly different from each other, then the Lie Factor of the Anchor has influenced the prediction.

Graph Type 1 = Lie Factor only.	LF
Graph Type 2 = Lie Factor plus a High Anchor value.	LF(+)
Graph Type 3 = Lie Factor plus a Low Anchor value.	LF(-)

RESULTS AND ANALYSIS

The subjects for this study were students four sections of the Business Law 201 course taught at an AACSB accredited university. That course was selected because, as a required course in the business core, it would contain

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a wide range of majors, including nonbusiness majors. The subjects represent typical graph users in the sense that the business law class had not covered the topic of deceptive use of graphs prior to the experiment. A total of 157 complete survey instruments were obtained in the experiment and used in the analysis. The gender distribution of the subjects approximately equal, with 71 females and 86 males.

Analysis of the survey results began with the conversion of all survey instrument predictions back into common base dollars, i.e., in terms of the original twelve week noisy base series starting at 155 and ending at 100. Thus the subject predictions for a graph showing a series that had originally been multiplied by 287 were first divided by 287 to convert the predictions back into base series terms. The S.A.S. statistical software program was then used to perform ANOVA calculations on the mean subject Week 13 predictions for each of the six graphs. The ANOVA model was significant with an F-Value of 7.26 and a P-Value of 0.0001.

Multiple comparisons using the Tukey Studentized Range Test procedure available in the SAS statistical software were also performed. The Minimum Significant Difference was calculated to be 2.8242. Figure 2 presents the prediction means for the three graph types in each of the two Lie Factor sets.

The Lie Factor 4 and 12 predictions for Graph Type 1 (no anchor) were statistically significantly different from each other and the Lie Factor 12 prediction also significantly diverged from the best prediction value of 95.0. The Lie Factor 4, Graph Type 1 was significantly different from Graph Type 3 (low anchor), and also different



from Lie Factor 12, Graph Types 1 and 3. Lie Factor 12, Graph Type1 was different from the Type 2 graphs (high anchor), for both Lie Factor 12 and 4.

To test for the existence of any gender difference in the perception of graphical data ANOVA was also performed on the means of the six graph types after sorting the male and female predictions into separate groups. The ANOVA model was significant with an F-Value of 4.10 and a P-Value of 0.0001. The Tukey calculation of the Minimum Significant Difference was 4.7714. Figure 3 presents the prediction means by gender for the Lie Factor 4 set and Figure 4 does the same for the Lie Factor 12 set.

For Graph Type 1, the male and female predictions were essentially the same for both Lie Factor 4 and Lie Factor 12. The same was true for Graph Type 2 (high anchor), for Lie Factor 4. There was a divergence between male



and female predictions for Graph Type 2, for Lie Factor influenced in the opposite direction by the Low Anchor, 12, and also for Graph Type 3 (low anchor), for both i.e., in the presence of a Low Anchor the males were more Lie Factor 4 and 12. However, the differences were not likely to make a higher prediction than the Best Prediclarge enough to be statistically significant. There is an tion value, and also much higher than the females when interesting result for Graph Type 3 (low anchor). For the females were given no anchor. But for males given Lie both Lie Factors the prediction means invert and the Factor 12 graphs, their predictions when given no anchor males predicted higher values than the females. There in Graph Type 1 were significantly higher than the Best were statistically significant differences in the predictions Prediction value, while the same female predictions were with genders. The male prediction for Graph Type 3, was not significantly higher. significantly higher than the prediction for Graph Type 1 Our study makes a contribution to the literature by for Lie Factor 4. Other statistically significant differences extending the work of Beattie and Jones to graphs with a are found when comparing the Lie Factor 4 predictions descending trend. We detect significant differences due with the Lie Factor 12 predictions. Both the male and to high Lie Factors and also differences between genders. female predictions for Lie Factor 4 for Graph Type1 are Our work can be extended by next examining predictions significantly lower than the predictions for both males with increasing trends, or trends that both increase and and females for Lie Factor 12 for Graph Type 1.

CONCLUSIONS

Returning to the three research hypotheses specified earlier, analysis of the experimental results provide the following:

Ha1: User predictions are influenced by graphs containing a high Lie Factor.

The null is rejected for certain graphs. In Figure 2, the Lie Factor 12, Graph Type 1 (no anchor) was significantly different from Lie Factor 4, Graph Type 1, and also significantly different from the Best Prediction value. In both cases it was significantly higher. This is an interesting result because the subjects, on average, were resistant to being deceived by the high Lie Factor 12 into predicting a lower Week 13 value.

Ha2: User predictions are influenced when an anchor value is included with the graph.

The null is not rejected. The overall group predictions in Figure 2, Graph Type 2 (high anchor) and Graph Type 3 (low anchor) both produced predictions that were essentially identical and not significantly different from the Best Prediction value. Those same two graph types, broken out into Male and Female groups in Figures 3 and 4 did not produce significantly different predictions between genders.

Ha3: There are differences in graph user predictions between genders. he null is rejected for certain graphs. In Figure 3, for Lie peter 4, the male Graph Type 3 (low anchor) prediction

The null is rejected for certain graphs. In Figure 3, for Lie Factor 4, the male Graph Type 3 (low anchor) prediction is significantly higher than the female Graph Type 1 (no anchor). In Figure 4, for Lie Factor 12, the situation is reversed as the male Graph Type 1 (no anchor) prediction is significantly higher than the female Graph Type 3 (low anchor). It appears that males, for Lie Factor 4, were

Our study makes a contribution to the literature by extending the work of Beattie and Jones to graphs with a descending trend. We detect significant differences due to high Lie Factors and also differences between genders. Our work can be extended by next examining predictions with increasing trends, or trends that both increase and decrease over the time period. Our results are for the subjects in our study and may not be generalizable to other groups. However our subjects were chosen not because they possessed any type of specialized knowledge, but because they could reasonably be said to represent typical users of graphical information. Thus our student subjects were surrogates for human beings and our study seems to be an appropriate use of their perceptions.

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Paperless Processes: Survey of CPA firms in a Smaller Market Regarding Obstacles, Challenges and Benefits of Implementation

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ABSTRACT

Many professional CPA firms are taking advantage of technology and software to implement paperless office processes in their client services and firm operations. With current technology, a paperless office is not just for large firms, in large markets. The survey was sent to partners of firms in a smaller business market and the firms were generally smaller firms. The survey results regarding obstacles, challenges, and benefits of "going paperless," found that partners of firms who had implemented paperless processes, generally indicated a higher level of challenges than the partners of firms who had not yet implemented paperless processes. This suggests that implementation of paperless office practices was more difficult than anticipated before implementation. However, the partners of smaller firms that had implemented paperless processes agreed fairly strongly with the benefits of "going paperless." The results of the benefits questions in the survey showed that the partners seem to believe that the benefits of paperless processes generally are worth the obstacles and challenges.

INTRODUCTION

What can you do with a digital copy of a document that you cannot do with a paper copy? Document imaging may be the single most profitable technology for boosting productivity and reducing costs of running a practice. Many firms have been "paperless" for years. Listen to what Dan Williams, CPA and managing Partner of Williams, Pitts & Beard in Missisippi has to say about paper: "By using [a] document management system, we increased productivity this tax season by 20 percent. " A mid-sized firm in New York City, Reminick, Aarons, and Company transformed their file room into a non-paper environment to minimize the possibility of losing files and to ensure quick access to client information. After implementation, Reminick's file room has diminished by 25% and professionals are no longer spending too much time reviewing and rerouting paper-based files and looking for misplaced documents (Lombardo 2002).

Document imaging is not just for the big firm. Small firms may benefit the most from using less paper. Why? Because the need to leverage limited time, energy and resources is so much greater in a small firm where there is no army of file clerks, mail carriers, and other staff to do the leg work. A document image costs the same as a photocopy but increases exponentially what you can do with the document. In addition to boosting productivity and saving money, there are many intangible benefits to generating less paper. The most important of these is happy clients. Many clients already do much of their work in a digital world, and having an accountant who is digital friendly makes working with the firm that much easier. Happy clients generate more work, give more referrals, and pay their bills. A firm that employs strategies for generating less paper may also compete better to attract new clients because it has a modern, efficient, quality-driven, and cost-conscious image (Ahmad, 2011).

Larger accounting firms generally have a higher level of The cost/benefit relationship for "going paperless" is hard paperless processes than smaller firms (Davis, et al 2012). Although this is no surprise, the survey results of the benchmarking questions used by Davis et al, 2012, also suggested that the local or smaller firms reporting themselves as paperless may not be as paperless to the degree they might think they are. Extending results reported in Davis et al 2012, this article reports results of questions and benefits of "going paperless." to smaller firms' regarding obstacles, challenges, and benefits of implementing paperless processes in their firms. The results included firms that have implemented paperless processes and those that have not, including firms that The original survey was sent out to partners of firms listed have implemented paperless processes in one area of their as their firm's contact person with the Utah Association practice but not in another. This survey helps answer the question? "Why don't more small firms take the plunge to "paperless processes?" And for firm's that have made the transition, "What were the difficulties?" and, "Was the pain of the transition worth the benefits?"

Obstacles, Challenges and Benefits to Going Paperless

In recent years, paperless processes and technology have been developed and increasingly used by businesses and professional firms and touted as a means to lower costs of operation and be more efficient, while at the same time provide better service to customers and clients (Special Focus Report, 2011; AICPA, 2010). Professional firms face challenges to change from paper to digital processes that help professionals provide services to clients/patients, as well as communicate, record, and document these services in a secure manner. Many professionals may feel a reluctance to change the way their firm completes these activities, even if they believe the benefits are worth the costs.

Over the last several years, several articles have discussed the implementation, benefits and best practices of paperless processes in accounting (Forum of Private Business, 2008; Albrecht, 2009; Manzelli, 2010; Jennings, 2011). Some estimates of reduced cost in paper, storage, processing time, and search time reach up to 30 percent. As computer hardware and software has developed, the cost and complexity of "going paperless" has been reduced, thus making paperless processes more accessible and useful to large as well as small organizations (Davis and Davis 2004; Graham, 2006; DeFelice, 2007). However, other than the regular benchmarking survey done every other year (see Kepczyk 2008, 2010, 2011), survey data related to firms' implementation of paperless process is lacking. In addition, survey data specifically related to obstacles, challenges and benefits of going paperless is scarce especially for smaller firms.

to measure and quantify. Both benefits and costs can be tangible or intangible—some easily measured and some very difficult to quantify. Benefits and costs are quantitative as well as qualitative. The questions and responses from the survey to these smaller firms provide useful measures that firms can use to help them evaluate the costs

The Survev

of Certified Public Accountants (UACPA). The request, conducted via e-mail, explained the survey and included a link to the online survey administered using Survey-MonkeyTM. Also included in the e-mail was a link to the results of the AAA 2009 Benchmarking Paperless Office Best Practices Survey (Kepczyk, December, 2008). Two follow-up requests were also sent via email. Each respondent completed the survey by going to the Survey-MonkeyTM link. After answering the firm information questions and completing the 30 benchmarking questions (see Davis et al, 2012), the respondents then tackled the "obstacles /challenges" questions followed by questions regarding benefits of going paperless. The questions regarding obstacles and challenges of implementing paperless processes were answered by both implementers and nonimplementers. The benefit questions were answered only by implementers.

The questions regarding obstacles, challenges and benefits were developed by the authors from a review of the referenced articles. Statements and data found in the referenced articles were used to come up with the set of obstacles, challenges and benefit questions. Once the questions were developed, the questions were shown to a partner of a large local firm that had some experience in implementing paperless or digital processes at his firm. Also, one of the authors uses digital process practices in his small law firm and provides professional education and training to lawyers and law firms to help them become paperless. He has helped several law firms "go paperless."

RESULTS

Firm Information and Overall Paperless Results

A total of 51 partners responded out of approximately 300 emails sent to partners listed for their firms as the contact person for the UACPA. The response rate is about 17%. Sixty seven percent of the respondents answered as implementers and 33% answered as non-implementers. Of the non-implementers, 60% indicated that they intended to size of responders was about 23 professionals.

Results of Obstacles/Challenges Questions

The partners were asked to respond to 14 questions (questions #31 through #44) regarding obstacles and challengwhere to start, assigning access and user rights, and digital es. Of the 51 respondents, 36 answered the questions as signatures. implementers and 18 answered the questions as non-im-Exhibit 3 also shows that implementers have stronger plementers. That means three respondents answered the concerns than non-implementers for all top four conquestions as both an implementer and non-implementer. cerns. In fact, the lowest percentage of concern for the top This is possible because some firms had implemented in four obstacle questions for implementers is higher than one practice area, but not another. However, three rethe highest percentage of concern for non-implementers. spondents does not provide enough useful information Although non-implementers do have concerns about to compare their answers as a non-implementer and an implementation, in general the non-implementers level implementer. of disagreement with the obstacle/challenge questions is The respondents were asked to answer the questions using stronger than their level of agreement. This result suggests the five ordinal categories of "Strongly Agree," "Agree," that non-implementers seem to be optimistic about imple-"Neutral," "Disagree," and "Strongly Disagree." Responmenting the paperless process. This implied optimism of dents could also answer "Don't Know," which was rarely the non-implementers is consistent with the results that chosen. Exhibit 1 shows the implementer response cat-60% of the non-implementing partners plan to implement egory percentages for each question. The bar graph in paperless processes in the future.

Exhibit 1 shows the sum of the percentages for "Strongly Looking at each individual question, only two obstacles/ Agree and Agree" for each question. Likewise, Exhibit 2 challenges concern percentages for implementers were presents the non-implementer response percentages. The lower than the non-implementers concern percentages. tables include percentages for combined "strongly agree Non-implementers were more concerned than impleand agree" as well as the "disagree and strongly disagree" menters only for: #37- Continuing Costs of paperless categories for each questions as well as the average of all office practices (33% to 22%), and #44-Decrease in prothe questions (bolded in the table body). A comparison of ductivity (33% to 14%). This means that, after implethe top concerns for implementers and non-implementers mentation, there may have not been as much increase in is found Exhibit 3. continuing costs nor as much decrease in productivity as expected before the implementation process. This result of a fairly low concern by implementers about "decrease in productivity" is consistent with the result that nearly 80 percent of implementing partners agreed with the benefit that productivity of professionals increased due to "going paperless."

Except for the obstacle question #41--We had to change the way we do things, the top four obstacles are the same for both implementers and non-implementers, only in a slightly different order. Question #36-Cost of Implementation was the highest concern (61%) for implementers and tied for third highest concern (39%) for non-implementers. Personnel resistance (question #38) was the Although the response results for the implementing and second highest concern (58%) for implementers and was non-implementing groups individually provide interesttied for third highest concern (39%) for non-implementing information about the obstacles and challenges reers. Question #39--Personnel having difficulty changing garding "going paperless," a comparison of the two groups' work processes was tied for third highest concern (53%) responses provide information about how actually going for implementers and was the highest concern (47%) for through the implementation process may change partners' non-implementers. Finally, question #33-Developing perception of the obstacles. Exhibit 4 shows a compari-Classification Scheme . . . also tied for third highest conson of the implementer group with the non-implementer cern (53%) for implementers was the second highest congroup responses for each question using "Strongly Agree" cern (44%) for non-implementers. In summary, the results and "Agree" responses only. The graph in Exhibit 4 shows show that both groups agree that personnel issues are two the average of all the questions and the difference between of the top four obstacles and challenges, and that cost of the averages for implementers and non-implementers implementation and design of the database for future accomparing the "strongly agree and agree" responses. cess efficiency are also in the top four concerns.

"go paperless" in the fairly near future. The average firm The questions about obstacles that did not seem to be of very high concern for implementers included security/confidentiality issues, a decrease in productivity, not knowing where to start, and ongoing costs of paperless processes. Non-implementing firms were not too concerned about challenges of security/confidentiality issues, not knowing

Exhibit 1: Implementers "Obstacles/Challenges" Questions Response Percentages

Answer Options	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know	Total %
31. Computer technological challenges related to data storage and					-		
backup.	2.78%	41.67%	22.22%	22.22%	11.11%	0.00%	100.00%
	ľ	44.44%		33.33%			
32. Computer network (LAN and WAN) technological challenges.	5.71%	34.29%	31.43%	20.00%	8.57%	0.00%	100.00%
	ľ	40.00%		28.57%			
33. Developing classification scheme for storing documents electronically							
and enabling efficient search and access.	2.78%	50.00%	25.00%	16.67%	5.56%	0.00%	100.00%
	ľ	52.78%		22.22%			
34. Setting up of user access and security and deciding who should have							
what rights to access (e.g. read/write, read only, no access).	2.86%	25.71%	42.86%	20.00%	8.57%	0.00%	100.00%
	ľ	28.57%		28.57%			
35. Extra time to scan or convert incoming or prepared documents to							
proper file types for efficient and effective storage, retrieval, and							
additional processing.	5.56%	44.44%	19.44%	19.44%	11.11%	0.00%	100.00%
	ľ	50.00%		30.56%			
36. Cost of implementation.	13.89%	47.22%	27.78%	5.56%	5.56%	0.00%	100.00%
	ľ	61.11%		11.11%			
37. Continuing costs of paperless office practices.	2.78%	19.44%	33.33%	33.33%	11.11%	0.00%	100.00%
	ľ	22.22%		44.44%			
38. Personnel resistance.	8.33%	50.00%	8.33%	22.22%	11.11%	0.00%	100.00%
	ľ	58.33%		33.33%			
39. Personnel having difficulty changing their work processes.	8.33%	44.44%	13.89%	22.22%	11.11%	0.00%	100.00%
	ľ	52.78%		33.33%			
40. We did not know where to start.	0.00%	22.22%	33.33%	27.78%	16.67%	0.00%	100.00%
	ľ	22.22%		44.44%			
 We had to change the way we do things. 	5.56%	47.22%	25.00%	16.67%	5.56%	0.00%	100.00%
	ľ	52.78%		22.22%			
Security/Confidentiality is compromised.	2.78%	8.33%	36.11%	36.11%	16.67%	0.00%	100.00%
		11.11%		52.78%			
43 Not comfortable with digital signatures instead of written signatures	6.06%	21 21%	36 11%	13.80%	16 67%	8 33%	100 00%
-5. Not control table with digital signatures instead of written signatures.	0.0070	21.21/0	50.1170	30 56%	10.07 /0	0.5570	100.00 /
14. Docroase in productivity	2 790/	11 110/	5 5604	52 790/	77 790/-	0.00%	100 000/
The bed case in productivity.	2.7070	13 80%	5.5070	80 56%	27.7070	0.0070	100.00 /
Averages	0.05013	33 38%	25 74%	23 49%	11 94%	0.60%	100 00%
Averages "Total Strongly Agree and Agree." Neutral "	0.05015	03.30 /0	23.7470	23.45 70	11.3470	5.00 /0	100.00 /
"Disagree and Strongly Disagree"		38.39%	25.74%	35.43%			
	answered	auestion		0014070		36	
	skinned a	uestion				15	

Obstacles - Implementing and utilizing Paperless Office Practices present (ed) our firm with the following obstacles and challenges:



The firm has not implemented Papeness Office Practices bed	ause of the	e ionowing o	obstacies	and challe	nges:		
Answer Options	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know	Total %
31. Computer technological challenges related to data storage and							
backup.	5.56%	22.22%	22.22%	16.67%	33.33%	0.00%	100.00%
	ľ	27.78%		50.00%			
32. Computer network (LAN and WAN) technological challenges.	0.00%	33.33%	16.67%	16.67%	33.33%	0.00%	100.00%
		33.33%		50.00%			
33. Developing classification scheme for storing documents electronically							
and enabling efficient search and access.	11.11%	33.33%	22.22%	5.56%	27.78%	0.00%	100.00%
	· · · · ·	44.44%		33.33%			
34. Setting up of user access and security and deciding who should have what rights to access (e.g. read/write, read only, no access).	5.56%	16.67%	33.33%	11.11%	33.33%	0.00%	100.00%
		22.22%		44.44%			
35. Extra time to scan or convert incoming or prepared documents to proper file types for efficient and effective storage, retrieval, and additional processing.	5.56%	22.22%	16.67%	22.22%	33.33%	0.00%	100.00%
		27.78%		55.56%			
36. Cost of implementation.	11.11%	27.78%	22.22%	16.6/%	22.22%	0.00%	100.00%
	0.000/	38.89%	22.220/	38.89%	27 700/	0.000/	100.000/
37. Continuing costs or paperiess office practices.	0.00%	33.33%	22.22%	10.0/%	27.78%	0.00%	100.00%
20. Development were interest	11 110/	33.33%	16 670/	44.44%	27 700/	E E(0/	100.000/
30. Personner resistance.	11.11%	27.70%	10.07%	70 000/	27.76%	5.30%	100.00%
20 Dersonnel baying difficulty changing their work processes	11 760/	38.89%	E 990/	11 760/	20 / 10/-	E 990/-	100.00%
39. Personnel having unifculty changing their work processes.	11.70%	47 06%	J.0070	/ 11.70%	29.4170	5.00%	100.00%
40 We do not know where to start	0.00%	16 670/	16 670/	22 220/	22 220/-	0.00%	100.00%
HO. WE GO HOL NIOW WHELE LO SLALL.	0.00%	16 67%	10.07 70	66 670 /2	55.5570	0.00%	100.00%
41. We would have to change the way we do things	11 11%	16 67%	16 67%	11 11%	44 44%	0.00%	100.00%
11. We would have to change the way we do things.	11.1170	27 78%	10.07 /0	55 56%	11.1170	0.0070	100.0070
42 Security/Confidentiality is compromised	5 56%	5 56%	38.89%	22 22%	27 78%	0.00%	100.00%
12. Security connuctionity is compromised.	5.5070	11 11%	50.0570	50 00%	27.7070	0.0070	100.0070
		11111/0		50.00 /0			
43. Not comfortable with digital signatures instead of written signatures.	11.11%	11.11%	38.89%	16.67%	22.22%	0.00%	100.00%
		22.22%	5010570	38.89%		010070	10010070
44. Decrease in productivity.	0.00%	33.33%	11.11%	27.78%	27,78%	0.00%	100.00%
····· · · · · · · · · · · · · · · · ·		33.33%		55.56%			
Averages	6.40%	23.95%	21.45%	17.11%	30.28%	0.82%	100.00%
Averages "Total Strongly Agree and Agree," Neutral,"							
"Disagree and Strongly Disagree"		30.35%	21.45%	47.39%			
	answered	question				18	
	skipped a	uestion				33	

The firm has not implemented Paperless Office Practices because of the following obstacles and challenges:



Exhibit 2: Non-Implementers "Obstacles/Challenges" Questions Response Percentages

Exhibit 3: Comparison of the Top 4 Agree Percentages for Obstacles and Challenges by Implementer
and Non-Implementers

Implementers	Non-Implementers
(Sum of Strongly Agree and Agree	(Sum of Strongly Agree and Agree
Percentages)	Percentages)
#36Cost of Implementation (61.11%)	#39Personnel Have Difficulty Changing Their Work Processes (47.06%)
#38Personnel Resistance (58.33%)	#33Developing Classification Scheme for Storing Documents Electronically and Enabling Efficient Search and Access (44.44%)
 #33Developing Classification Scheme for Storing Documents Electronically and Enabling Efficient Search and Access (52.78%) #39Personnel Have Difficulty Changing Their Work Processes (52.78%) 	#36Cost of Implementation (38.89%) #38Personnel Resistance (38.89%)
#41We Had to Change the Way We Do Things (52.78%)	

The comparison overall clearly shows that implementers had higher percentage of concern with obstacles and challenges than did the non-implementers. This result implies that the implementation process was more difficult overall than anticipated before implementation. The obstacle of "We had to change the way we do things is the biggest difference in results between the two groups. Implementers found that changing the way they do things was much harder than those who had not implemented yet. This finding is indicative of actual implementation of systems projects, in general, having challenges in the design and or implementation phase not expected nor anticipated in the analysis phase of the system development life cycle (SDLC). Research in systems development has shown that the majority of systems projects end up either more than the budget, take longer than estimated, or both (see Ahler 2012).

Because the survey results showed that implementers had overall higher percentages of agreement to obstacles and challenges questions than non-implementers, further analysis was completed. The correlation between the implementers and non-implementers was calculated for

each of the obstacle/challenges questions. The correlations showed that questions 33, 38, 39, 40, 42, 43, and 44 had strong correlations (greater than .80) between implementers and non-implementers for obstacle and challenges of paperless processing. While the rest of the obstacle/ challenge questions had low correlations between implementers and non-implementers, two of the questions had negative correlations. Negative correlation indicates that agreement versus disagreement response percentages were opposite between implementers and non-implementers, which was the case for question 32 (Computer network challenges) and question 41 (We had or will have to change the way we do things). Strong correlations suggest that the implementers and non-implementers were generally on the same side of agreeing or disagreeing in their responses to each question. However, a strong correlation does not mean that relative response percentages of agreement, neutral and disagreement were also similar. So, further statistical comparisons were conducted using a chisquare test for independence between the implementers and non-implementers. A 3x2 design was used to compare the relative percentages of agreement, neutral, disagree-

Implementers		
Obstacles/Challenges Implementing and using	ng Paperless Prcoess	es-
Obstacles and Challenges	Strongly Agree	A
Average Implemented	5.01%	
Average Not Implemented	6.40%	
Difference: Implemented minus Not Implemented	-1.38%	
Obstacles and Challenges		St Ag
Average Implemented		





ment for the implementers versus the non-implementers. implementers generally had higher agreement percentages The null hypothesis is as follows: of obstacles and challenges than non-implementers for all. The chi-square results of independence between the HØ: The relative response percentages for agreeimplementers and non-implementers, together with the ment, neutral, and disagreement are the same results that implementers generally had higher response for implementers and non-implementers for agreement percentages with obstacle and challenges queseach obstacle and challenge question. tions, support the notion that actual implementation of For each of the obstacle and challenge questions, the null paperless processes was more challenging than anticipated hypothesis was rejected. All the p-values for each of the before implementation. obstacle and challenge question responses were less than

.001. That is, the implementers answer percentages for the categories of agreement, neutral and non-agreement have statistically different relative percentages. This statistical result is consistent with the results that showed

Benefits - Paperless Office Practices implemented in our fir	m have re	sulted i	n the fol	lowing ber	nefits or re	esults:	
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know	Total Percent
15. Reduced physical storage space for documents.	66.67%	30.77%	0.00%	0.00%	0.00%	2.56%	100.00%
46. Reduced paper costs.	41.03%	41.03%	12.82%	2.56%	0.00%	2.56%	100.00%
17. Reduced document loss.	25.64%	43.59%	23.08%	5.13%	0.00%	2.56%	100.00%
 More efficient document reproduction (to reproduce a document already orepared). 	35.90%	53.85%	2.56%	5.13%	0.00%	2.56%	100.00%
19. Easier and more efficient for firm professionals (not support staff) to find and access electronically stored documents than to find and access paper (physically stored) documents.	53.85%	41 03%	2 56%	0.00%	0.00%	2 56%	100.00%
50. Easier and more efficient for firm support staff (not accounting professionals) o find and access electronically stored documents than to find and access paper physically stored) documents.	42.11%	39.47%	13.16%	2.63%	0.00%	2.63%	100.00%
51. Easier and more efficient to access documents when not at the firm office.	58.97%	28.21%	10.26%	0.00%	0.00%	2.56%	100.00%
52. Increased work/time flexibility for personnel.	25.64%	43.59%	20.51%	7.69%	0.00%	2.56%	100.00%
i3. Increased support staff productivity.	20.51%	38.46%	35.90%	2.56%	0.00%	2.56%	100.00%
Increased accounting professionals' productivity.	25.64%	53.85%	17.95%	0.00%	0.00%	2.56%	100.00%
5. Improved our client service efficiency.	17.95%	58.97%	20.51%	0.00%	0.00%	2.56%	100.00%
Improved our client service effectiveness and completeness.	25.64%	53.85%	17.95%	0.00%	0.00%	2.56%	100.00%
7. Improved our client service communication.	25.64%	46.15%	25.64%	0.00%	0.00%	2.56%	100.00%
8. Improved client satisfaction.	23.08%	30.77%	38.46%	2.56%	0.00%	5.13%	100.00%
Averages	34.88%	43.11%	17.24%	2.02%	0.00%	2.75%	100.00%
Averages "Total Strongly Agree and Agree " Neutral " "Disagree and							

Benefits - Paperless Office Practices implemented in our firm have resulted in the following benefits or results:





Results of Benefits Questions

The implementers answered 14 questions (questions #45 through #58) regarding the benefits of "going paperless" for their firms. Exhibit 5 presents agreement percentages to questions about resulting benefits from implementing paperless processes. Implementers reported agreeing that implementation of

Implementers reported agreeing that implementation of Although computer costs increased by approximately 39% paperless processes reduced physical storage costs (97% due to implementing paperless processes, partners reportagreement), paper costs (82% agreement), and document ed a 64% reduction in physical storage space, a 41% reducloss (69% agreement). Partners of implementers also tion in paper costs, a 35% reduction in document loss, and strongly agreed that the firm benefited in terms of docu-37% reduction in time for staff and 42% reduction in time ment access efficiency (professionals, 95% agreement; for professionals to find and access documents. staff, 82% agreement), productivity for professionals (79% agreement) and staff (59% agreement), and work/ Finally, in asking partners questions about how they went time flexibility (69% agreement). Partners also strongly about implementation, only 18% used a consultant, 95% agreed that implementing paperless processes improved of the firms did the implementation themselves, while client service efficiency (77% agreement), client service only 5% outsourced the work. Most of the firms (88%) effectiveness and completeness (79% agreement), and cliused only their own local computer system to do their paent communication (72% agreement). They also reported perless processing, while 6% used an application service provider (ASP) and 6% used both local and ASP computer

agreement (54%) that client satisfaction was improved because the firm implemented paperless processes.

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services. In summary, the results show that smaller firms A firm that has successfully implemented document imagare successful at implementing paperless processes with their own personnel and that they have the knowledge and ability to perform the continued paperless processes. Finally, the results show that smaller accounting firms believe that the benefits of "going paperless" are worth the implementation obstacles and challenges.

LIMITATIONS, SUMMARY, AND CONCLUSIONS.

some measurement of the obstacles and challenges of "going paperless" reported by smaller accounting firms before and after implementation. The survey results also provide some measurement of the firms' benefits resulting from implementation of paperless processes. Although the sample was limited to Utah Firms, the survey results are useful for smaller firms in general to understand challenges and benefits of "going paperless." Since there were more implementing firms than non-implementing firms that answered the survey, a self-selection bias toward implementing firms may exist in the survey results. However, the number of responses of implementing and non-implementing firms is sufficient to provide useful information for a comparison of the two groups regarding questions about obstacles and challenges that were answered by the two groups.

The comparison of implementers and non-implementers responses regarding obstacles and challenges found that partners of firms who had implemented paperless processes generally indicated a higher level of challenges than the partners of firms who had not yet implemented paperless processes. This result suggests that actual implementation of paperless office practices for implementing firms turned out to be more difficult than anticipated before implementation.

The results related to benefits of "going paperless" showed that implementers strongly agreed that their firms benefitted from paperless processes in relation to reduced costs, reduced document loss, more efficient document retrieval, more productivity from staff and professionals, and more client service effectiveness, communication and satisfaction. Responders also reported that although computer costs increased approximately 39%, each of the other costs was reduced by 35% or more. In addition, implementation was carried out mostly by the firms themselves rather than outsourcing the work. The results of the benefits questions in the survey support the conclusion that the partners of implementing firms believe that the benefits of paperless processes generally are worth the obstacles and challenges.

ing in Atlanta, Havif, Arogteti & Wynn gives this advice about taking the plunge to paperless processes. "Know that prolonging a transition just prolongs the pain. Get it over with." (Phelan, S. E. 2003). Also, this survey says: "Take the plunge to paperless processes." After switching to paperless processes, you too will probably never, ever want to go back.

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Paperless Processes: Survey of CPA firms in a Smaller Market Regarding Obstacles, Challenges and Benefits of Implementation

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THE IMPACT OF DEFLATION: Are Negative Banks Rates Possible?

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ABSTRACT

Is the global economy on the cusp of a deflation era? Many economists think so. With inflation averaging less than 1.5% in 2013 in the U.S. and less than 1% across the Eurozone, and with central bank officials considering negative bank rates, fears are growing that forecasts of deflation are accurate. Defined as a sustained decline in the general level of prices, malign deflation has historically had an adverse, long-term impact on economies. But benign inflation, resulting from positive aggregate supply shocks, can co-exist with strong economic growth. This paper examines the concept of deflation in a historical and current context.

INTRODUCTION

The Federal Reserve and the European Central Bank (ECB) officials have shown a growing concern about low inflation and the possibility of deflation (Blackstone & Buell, 2014; Hilsenrath, 2014). Deflation is normally associated with negative economic growth and an upsurge in financial disintermediation (Beckworth, 2008). During the 2007-2009 recession, the inflation rate in the euro zone fell to levels never observed in the past. During the second quarter of 2009, the average prices in the euro zone declined by Ø.4 % on an annual basis. The decline in average prices has been attributed to several factors: a sharp decline in economic growth, the depreciation of the euro, and a plummet in oil prices as a result of a substantial excess of supply. From the third quarter in 2008 to the second quarter in 2009, inflation decreased from 3.8 % to a negative Ø.4% (Barrell & Fic, 2010).

LITERATURE REVIEW

Should Deflation Be a Concern?

Previous studies have generally linked deflation with weak or negative economic growth and a policy interest rate near zero (Beckworth, 2008). However, much of the literature reveals that deflation can either be malign

or benign (Selgin 1997, 1999; Cleveland Federal Reserve 1998; Stern, 2003; Bordo & Redish 2004; Bordo, Lane, & Redish, 2004; Bordo & Filardo, 2005; Borio & Filardo, 2004; Farrell, 2004; "From T-shirts to T-bonds," 2005; "Inflated expectations," 2004; King, 2004; and White, 2006). Researchers contend that a collapse in aggregate demand could result in malign deflation and an increase in aggregate supply could create benign deflation. Moreover, study results indicate that aggregate supply-driven deflation may be optimal and that it may be better to support aggregate supply-driven deflation today to avoid facing a possible troublesome correction of economic imbalances in the future ("From T-shirts to T-bonds," 2005; King, 2004; Selgin, 1997; and White, 2006). This conclusion runs contrary to the popular notion that inflation is considered standard and deflation is usually deemed to be harmful.

The literature has shown that deflation associated with a weak economy and persistent falling prices is caused by a severe collapse in aggregate demand that forces manufacturers to reduce prices on a regular basis to create sales (Beckworth, 2008). One reason to fear deflation is that as companies see their profits shrink, workers may experience pay cuts or layoffs. The economic phenomenon of deflation is believed to be more damaging on a macroeconomic level than inflation (DeLong, 1999). Due to a lower nominal interest rate threshold of zero, even an-

if prices decrease rapidly, and a large transfer of wealth from debtors to creditors may result if prices decline too far (DeLong, 1999). The transfer of wealth from debtors to creditors, as a result of repaying dollars more valuable than those borrowed, impedes the proper functioning of the economy's credit and financial intermediary system (DeLong, 1999). Additionally, since deflation might reduce the nominal federal funds rate to a lower bound of zero and reduce the possibility of using the policy rate to create additional monetary stimulus (DeLong, 1999), deflationary monetary policy is not a viable option given the impact it would have on financial institutions and debtors alike as they default on their loans due to the incapacity to carry the rising real burden of their debts (Steindl, 2000). The initial negative shock of unanticipated deflation and even the deflationary spiral of anticipated deflation could result in adverse economic consequences (DeLong, 1999).

Benion Deflation

A second type of deflation can be created by positive aggregate supply shocks that are not facilitated by the easing of monetary policy. Positive productivity innovations or input factors that reduce the unit costs of production can result in an aggregate supply shock that leads to lower prices. Positive aggregate supply shocks that are not accommodated by monetary policy produce a benign type of deflation where nominal spending is constant, due to an increase in output that offsets the decline in prices (Beckworth, 2008). Profit margins tend to remain constant as a result of lower output prices being matched by lower output cost. Nominal wages should remain constant and consumer purchasing power should increase due to lower prices (Selgin, 1997).

Deflation occurring due to productivity gains is benign since it creates economic growth and stable profit margins. Although benign deflation may result in lower nominal wages, the decline in wages is limited due to a strong increase in economic growth. Deflation and strong economic growth can co-exist; therefore deflation should not always be a concern (Beckworth, 2008).

Since deflation can be benign, policymakers should exercise caution before easing monetary policy at the first signs of deflation. Policy makers should determine the source of deflation to see if it is the result of positive aggregate supply shocks or negative aggregate demand shocks. Some proponents of this more nuanced deflationary view argue that there is a real possibility of aggregate supplydriven deflation and the wrong monetary policy could lead to a decline in macroeconomic stability (Selgin 1997, 1999; Cleveland Federal Reserve 1998; Bernard & Bisig-

ticipated deflation could result in high real interest rates nana 2001; "From T-shirts to T-bonds," 2005; "Inflated expectations," 2004; King, 2004; White, 2006).

WHERE DO WE STAND?

Top financial leaders continue to warn about low inflation and are seeking to quell downward price pressures that threaten consumption and delay debt reduction (Blackstone & Talley, 2014). Federal Reserve officials began the 2014 year hopeful that a strengthening US economy would increase very low inflation levels from 1% to the targeted rate of 2%. At the conclusion of an especially harsh winter that many believe dampened economic growth, there is little evidence that inflation is moving upward. Global central bank officials expressed worry over the persistence of low inflation at the recent International Monetary Fund (IMF) meetings. IMF's chief economist Oliver Blanchard warned of the "risk of deflation, negative inflation," and stated that "everything should be done to try to avoid it" (Hilsenrath, 2014, p. A4, para 3).

With US inflation below the Federal Reserve target of 2% for the 22nd straight month in February 2014, Blanchard's warning is difficult to dismiss. Fed officials view very low inflation as linked to low wages and low profit growth, making it harder for consumers and businesses to pay debts. Low inflation also tends to make people less inclined to spend and invest. Historically, inflation ran below the Fed's target for as long as the current 22-month period from 1997-2000 and ran under 2% for long stretches between 2001 and 2004 (Morath & Hilsenrath, 2014).

Deflation fears are of equal concern to European Central Bank (ECB) officials. Since November of 2013, ECB's main lending rate remains at a record low of \emptyset .25%. Dirk Schumacher, economist at Goldman Sachs, expects the ECB to reduce its main lending rate from 0.25% to 0.10%. He also expects a cut in overnight deposits from zero to -0.15%. Financial institutions would be required to pay to park their excess funds at the ECB, which could encourage more private sector loans (Morath & Hilsenrath, 2014).

The pressure on the ECB has mounted given reports of 0.5% inflation in March 2014, the lowest in four years and far below the ECB's target of just under 2% (Blackstone & Hannon, 2014). According to Draghi, the central bank will take more time to assess the longer-term outlook before considering another rate cut. Denmark has employed negative rates for the past two years, but it would be an unprecedented move for a major central bank (Morath & Hilsenrath, 2014). If the ECB goes negative with deposit rates, it would be the largest central bank to do so since the global financial crisis of 2008-2009. Consequences of negative deposit rates include weakening of the euro,

which would push up inflation via imported prices and icies to support benign deflation in the short-run may be provide a boost to exports (Blackstone & Hannon, 2014). preferable to the more damaging correction of economic imbalances in the long-run (King, 2004; Selgin,1997; In addition to reducing rates to less than zero on overand White, 2006). Negative bank rates are one possibly night bank deposits, solutions such as quantitative easing viable option for central bankers to use in response to a (i.e. asset purchases) have been discussed. Large-scale asset prolonged period of negative inflation or deflation. The purchases would influence the exchange rate by increasing authors of the current paper suggest that additional rethe supply of money in the banking system (Blackstone & search efforts should focus on the lesser-known economic Talley, 2014). phenomenon of benign deflation and its macroeconomic impact. More data is needed to support previous study CONCLUSION findings that supply-driven deflation may be preferable to an optimal level of inflation.

Low inflation is good, typically. It keeps long-term interest rates anchored and provides stability for households and businesses to spend and invest. Negative inflation or deflation, however, causes consumers to postpone purchases in hopes of getting a better deal as a reward for waiting. And since tax revenues and wages don't rise as much during excessively low inflationary times, it's harder for households, firms, and governments to service their debt (Blackstone & Buell, 2014). Deflation makes financing conditions tighter by increasing inflation-adjusted, commonly referred to as "real," interest rates. This restricts economic growth and makes it difficult for stimulus efforts to gain momentum. For these reasons, the Federal Reserve and the European Central Bank (ECB) officials have shown a growing concern about low inflation and the possibility of deflation.

Deflation is believed to be more damaging on a macroeconomic level than inflation (DeLong, 1999). Deflation can either be malign or benign. Currently, malign deflation is of great concern to U.S. and euro zone financial leaders. An important reason to fear malign deflation is that as companies see their profits shrink, workers may experience pay cuts or layoffs. Conversely, benign deflation occurs due to productivity gains, and thereby creates economic growth and stable profit margins. Past literature focuses more on the impact of malign deflation and strategies employed to combat its ill effects. The impact of benign deflation has received far less attention. Are the impacts of benign deflation presumed to be favorable, with no negative implications? Similar to the historical references to Japan's decades-long struggle with malign deflation as well as the U.S. experience of the Great Depression, are there historical references on which to base our beliefs regarding benign deflation?

The IMF Policy Committee continues to highlight weak price increases as the key drag on the global recovery, and Fed policy makers continue to worry about low inflation leading to outright deflation in the U.S. As central bankers explore their options, including a negative rate on bank deposits, perhaps a paradigm shift is needed. A number of researchers have concluded that employing monetary pol-

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Assessing the Validity of a Small Business Strategy Instrument Using Confirmatory Factor Analysis

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ABSTRACT

Most research involving small business strategy focused on the applicability of taxonomies and typologies (i.e., Miles and Snow Typology (1978)). Researchers were more concerned with developing instruments with a purpose to identify and classify a business into a certain category of strategy such as prospectors or defenders. The need to measure the unobservable strategy variable of a small business as compared to identify it with a particular type of strategy is crucial for theory advancement. The survey instrument measuring small business strategy developed by Cragg et al. (2002) offers one alternative for measurement but needs a validity study as the authors did not elaborate neither on the scale's psychometric properties nor on it construct validity. In an attempt to attend to this issue and provide researchers with a valid measure for small business strategy, this study uses a confirmatory factor analysis (CFA) to assess the validity of Gragg's et al. (2002) instrument. The analysis suggests a multidimensional scale with indicators loading on two distinct factors. Reliability and validity concerns are discussed and recommendations for future research are made.

INTRODUCTION

The literature on strategy and strategic management has long advocated for valid and reliable measures allowing for strong linkages between theoretical definitions and their measures (i.e., Vankatraman, 1989b; Vemktraman & Grant, 1986). Such measures are particularly needed in the context of small businesses to empirically allow for tests of theoretical concepts. Small businesses have gained more importance in recent years from both policy-makers and academics for their role as critical economic engines. However, there is little research, if any, on the measurement of the strategy construct as it relates to the small business environment. Strategic management theory depends on the conceptualization and measurement of the strategy concept and small business strategy needs a valid measure. This study intends to validate an existing instrument developed by Cragg, King, and Hussin (2002) in the context of small business.

Most research involving small business strategy focused on the applicability of taxonomies and typologies (i.e., Miles and Snow Typology (1978)). Researchers were more concerned with developing instruments with a purpose to identify and classify a business into a certain category of strategy such as prospectors or defenders. The need to measure the unobservable strategy variable of a small business as compared to identify it with a particular type of strategy is crucial for theory advancement. The survey instrument measuring small business strategy developed by Cragg et al. (2002) offers one alternative for measurement but needs a validity study as the authors did not elaborate neither on the scale's psychometric properties nor on it validity. In an attempt to attend to this issue and provide researchers with a valid measure for small business strategy, this study uses a confirmatory factor analysis (CFA) to assess the validity of Gragg's et al. (2002) instrument.

CFA is used for evaluating relationships between observed measures and latent variables. It emphasizes theory and hypothesis testing and is commonly used to examine the factorial structure of a test instrument thereby verifying the number of underlying dimensions of a measurement instrument. CFA is also an important and often necessary analytical tool for construct validation (Brown, 2006). CFA results provide investigators with strong information on convergent and discriminant validity of theoretical constructs (Brown, 2006; Sun, 2005). Convergent validity is indicated by a set of indicators (items) loading on the same factor (i.e., measuring the same dimension), and discriminant validity is indicated by a CFA results that distinguish factors from each other as not highly interrelated (Brown, 2006; Kline, 1998).

CFA also allows researchers to examine the appropriateness of using existing measures for different populations assessing thereby aspects of the validity of measures (Harrington, 2009). Note that CFA requires specifying a priori a measurement model that is strongly grounded in empirical evidence and theory. The specification of the measurement model in this study is based on a factor analysis that identified the number of factors and the pattern of indicator-factor loadings. The following section presents the research methods followed by the results of the CFA. The paper concludes with a discussion and recommendations and suggestions for future research.

RESEARCH METHODS

The small business strategy instrument under evaluation was developed by Cragg et al. (2002) and consists of nine items. That is, Cragg et al. (2002) suggested that small businesses compete on 9 different types of strategies. These are: pricing strategy leadership (BS1), quality products strategy (BS2), differentiation strategy (BS3), innovation strategy (BS4), diversification strategy (BS5), efficiency strategy (BS6), quality customer service strategy (BS7), intensive marketing strategy (BS8), and market expansion strategy (BS9).

Data Collection

A web-based survey questionnaire was used for data collection. The survey sample consisted of 900 U.S small business executives. Respondents were sourced from an independent sampling firm, which compiled and provided a random list of executives' emails and other contact information. The business size, as a sampling criterion, was determined, according to the Small Business Administration guidelines, by a maximum of 500 employees. The number of employees determined the business size such that businesses employing between 100 and 500 employees were included in the study. The upper limit is in line with the guidelines of the Small Business Administration, while the lower limit was set to ensure adequate level of formal business strategy-making process.

Eight per cent (8%) of respondents returned usable surveys. Respondents were identified as 67.6% CEOs, 21% general managers, and 11% as owners of their respective businesses. Participating organizations had revenues from the low \$10 to \$19 million to more than \$100 million. Participants also covered a wide range of industries: 14% manufacturing, 20% retailing, 18% finance and insurance, 8% healthcare, 7% wholesale distribution, and 18% identified themselves under other industries. An independent-samples *t*-test analyzed the non-response bias. The test was performed on two equal groups of respondents identified such that the last 50% of the participants (Lindner, Murphy, and Briers, 2001) were considered as the late respondents. The two groups were compared on their re-

sponses to the Likert-like scale questions. The result indicated that the findings can be generalized to the target population and non-response bias cannot be considered as a threat to external validity.

Factor Analysis

As mentioned earlier CFA requires strong theoretical background or empirical evidence as a basis for model specification. Often EFA (exploratory factor analysis)) serves as a ground work for a CFA analysis. In this study a PCA (principal component analysis) was conducted for data reduction and factor structure identification. Stevens (2002) recommends using PCA instead of EFA and Harrington (2009) notes that PCA may be used for similar purposes as EFA. The following is a description of the small business instrument under evaluation.

The factor analysis in this study used principle component as an extraction method (PCA), Kaiser rule of eigenvalues greater than one for factor extraction and retention, varimax orthogonal rotation with Kaiser normalization as a factor rotation method, and loading size cut-off value of Ø.55 for content validity analysis (Kearns & Lederer, 2003). Tabachnick and Fidell (2013) recommend loadings with sizes of Ø.55 as good ones. The results indicate that the instrument is a multidimensional scale with two factors (see Table 2). Items loaded well on two factors with loads greater than .55, which can be attributed to measuring two underlying dimensions of business strategy: strategies for building and sustaining business image and reputation (BIR), and strategies for growth and expansion (STRAGE). The two factors explain more than 65% of the variation (Table 3). Also, given the large values of sampling adequacy and communalities (Table 1), the variables seem to be acceptable. In addition, a KMO and Bartlett's test resulted in a value of .795 with a p-value of .000 indicating acceptable measures and that a factor analysis is reasonably doable (Norušis, 2008). Zhao (2009), citing MacCallum, Widaman, Zhang, and Hong (1999), recommends values for communalities greater than Ø.60. However, BS4 (innovation strategy) exhibits weak values of sampling adequacy, communality, and squared multiple correlation (Table 1) suggesting dropping the item from the instrument pending further analysis (a correlation matrix also showed weak values involving BS4). Also, the large values of squared multiple correlation (Table 1) provide evidence that the instrument's items, although loading on two distinct factors, measure the same construct.

Reliability Analysis

The reliability concept is a characteristic of the quality of measurement; it informs the consistency of the measures

TABLE 1 FACTOR ANALYSIS STATISTICS							
	Communalities	Sampling Adequacy	Squared Multiple Correlation				
Pricing leadership strategy	.817	.806ª	.787				
Quality Products Strategy	.875	.766ª	.855				
Differentiation Strategy	.774	78ت	.726				
Innovation Strategy	.345	.511ª	.199				
Diversification Strategy	.708	.86ت	.619				
Efficiency Strategy	.702	.872ª	.590				
Quality Customer Service Strategy	.490	.836ª	.419				
Intensive Marketing Strategy	.552	.758ª	.514				
Market Expansion Strategy	.638	.728ª	.331				
a. Measures of Sampling Adequacy (MSA)							

TABLE 2 PRINCIPAL COMPONENT ANALYSIS Research Component Materia			TABLE 3 EXTRACTION STATISTICS FOR PRINCIPAL COMPONENTS				
Kotated Component Matrix		-	Initial Eigenvalues				
Strategy	1	2	Component	Total	% of Variance	Cumulative %	
Pricing leadership	872		1	4 351	48 339	48 339	
Quality Products	.897			1.552	17 220	65 579	
Differentiation	.869			025	1/.237	75.0(4	
Innovation		.555	3	.935	10.385	/5.964	
Diversification		.661	4	.639	7.095	83.060	
Efficiency		694	5	.545	6.057	89.116	
Oralizz Craster on Semice	(07	.071	6	.38Ø	4.222	93.339	
Quality Customer Service	.697		7	.309	3.437	96.776	
Intensive Marketing		.729	8	.195	2.164	98.939	
Market Expansion		.777	0	Ø95	1.061	100,000	
Extraction Method: Principal C Rotation Method: Varimax with	omponent Ana Kaiser Norma	alysis. alization.		.075	1.001	100.000	
a. Rotation converged in 3 iterati	ions.						

(Trochim, 2006). It is "a measure of the correlation between scores on the test and the hypothetical true value" (Norušis, 2008, p. 427). The reliability of a measure is a necessary condition of its validity (Garson, 2010).

According to the factor analysis, the items on the instrument tapped into two underlying strategy dimensions which suggested analyzing the subscales separately (Norušis, 2008, p.430). Reliability analysis on the full scale generated a very low value of Cronbach's alpha

 $(\alpha = .256$: Table 3) indicating the need for further analysis (Garson, 2010; Norušis, 2010, and Ch Yu, 2001). Multidimensionality, as suggested by Norušis (2008), can be "one possible explanation" for low values of the coefficient alpha. A small value of alpha is, therefore, not necessarily an indication of a bad test or measure, but a sign for further and deeper analysis of the data. Norušis (2008) and Ch Yu (2001) recommend factor-analyzing the instrument to look for latent variables; a procedure conducted and presented in the previous section. Moreover, in an evaluation on the misconceptions and misapplications of Cronbach alpha, Ch Yu (2001) highlights, the confusions of consistency and dimensionality, the misinterpretation of high and low alpha value for multidimensional scales, and premature conclusions on low Cronbach alpha values as confusions due to a lack of conceptual understanding. Ch Yu specifically warns researchers to be careful with interpreting low alpha as a result of a bad test. Cronbach alpha is deflated for multidimensional scales. In some situations, interpreting low alpha as an absence of unidimensionality is correct. If a test is unidimensional, it will show consistency. However, although internally consistent, a test may have subscales and show multidimensionality. Unidimensionality is a subset of consistency and both concepts commend separate assessments (Ch Yu, 2001). The reliability of the business strategy instrument was, therefore, analyzed as a multidimensional scale with two subscales as determined by the factor analysis.

Table 4 shows that the average scores for inter-item correlations, run on the full scale, are very week indicating that the items of the full instrument are not strongly related, which adds support for the existence of latent variables (multidimensionality). The table also reports the analysis run on of the two subscales (factors) as determined by the factor analysis. Subscale 1 and subscale 2 show acceptable values of both alpha and the averages of inter-item correlations.

Subscale 1 consists of the items: pricing strategy leadership (BS1), quality products strategy (BS2), differentiation strategy (BS3), and quality customer service strategy (BS7). The subscale was labeled as measure for strategies for business image and reputation (BIR). Note that BS1 was dropped because the 4-item subscale generated a negative value of alpha, which violates the reliability model assumptions. Results of item-total statistics indicated that dropping BS1 (pricing leadership strategy) improves the value of alpha and brings it to an acceptable value of 0.808. Similarly, by deleting BS1, the mean value of interitem correlations improved considerably from the values of Ø.054 to 0.587. Both improved values indicated that the retained items are fairly related. In addition dropping BS1, which measures pricing strategy leadership, does not seem to affect the full measuring construct as the component efficiency strategy may just measure the ability of a business to sustain a pricing strategy leadership (the two components seem to be redundant).

Subscale 2 consists of the items innovation strategy (BS4), diversification strategy (BS5), efficiency strategy (BS6), intensive marketing strategy (BS8), and market expansion strategy (BS9). The factor or subscale was labeled as a measure of strategies for growth and expansion

(STRAGE). The STRAGE measure shows an acceptable Cronbach's alpha of Ø.775; but an examination of itemtotal statistics indicated that eliminating BS4 (innovation strategy), as suggested previously by the data analysis, namely, the values of individual KMO, the communality, and the squared multiple correlation, would improve the reliability coefficient from 0.775 to 0.808. Dropping BS4 improved not only the coefficient alpha but also the mean value of inter-item correlations and their range.

CONFIRMATORY FACTOR ANALYSIS

The previous factor analysis found that the small business strategy scale is multidimensional with two latent variables; a factorial structure that was used as a foundation for the following CFA. First, a CFA on the full original scale of business strategy (9 items) as developed and used by Cragg et al., (2002) was conducted and compared to a CFA on the reduced scale (7 items). This comparison was important as it provided additional support for the factor structure determined by the PCA. The results of the PCA and the reliability analysis showed that the business strategy scale is more consistent with the retained 7 items.

The model foundation for this CFA is simple with two factors (BIR and STRAGE: respectively strategies for business image and reputation, and strategies for growth and expansion), and items had acceptable communalities in general (all above .60 except for BS4 and BS8, which had respectively values of .35 and .55); BS4 was dropped from the final scale (7 items) for reliability concerns, among other concerns. The simplicity of the model is a desirable condition for small departures from the multivariate normality: a requirement for CFA procedures. Normality was assessed by examination of the skewness and kurtosis indices. According to Kline's (2005) criteria (absolute values of skew greater than 3.0 indicate extreme skewness and absolute values of kurtosis greater than 10.0 suggest the existence of a problem), skewness and kurtosis did not appear to be a concern (see Table 5) and the data set had no missing values. The CFA assumptions are, therefore, considered met.

TABLE 4 CRONBACH ALPHA COFFFICIENTS						
	Cronbach Alpha	Inter-item correlations (mean)	Number of items			
Full Scale	.256	.Ø4Ø	9			
Subscale 1	.808	.587	3			
Subscale 2	.808	.532	4			

TABLE 5 ASSESSMENT OF NORMALITY								
Variable	min	max	skew	c.r.	kurtosis	c.r.		
BS7	3.000	5.000	2Ø4	702	981	-1.688		
BS3	2.000	5.000	200	689	929	-1.598		
BS2	2.000	5.000	344	-1.184	656	-1.128		
BS9	2.000	5.000	444	-1.526	62Ø	-1.067		
BS8	2.000	5.000	.262	.900	-1.091	-1.876		
BS6	2.000	5.000	322	-1.109	507	873		
BS1	1.000	5.000	.300	1.031	-1.213	-2.086		
BS5	2.000	5.000	.116	.400	-1.273	-2.189		
BS4	2.000	5.000	-1.260	-4.336	2.235	3.845		
Multivariate					3.386	1.Ø14		

The CFA was run using Amos[™] 18 with maximum likeli-Results hood estimation. Figure 1 presents the graphics input or Although there is no consensus in the literature on the the specified model, according to the findings of the facnumber and nature of fit indices to use for model evalutor analysis, displaying the standardized estimates of the ation when performing a CFA analysis, Brown (2006) factors loadings or regression coefficients. The correlation recommends at least one index from each fit category (abbetween the two latent variables (BIR and STRAGE) is solute, parsimony, comparative) as each category provides Ø.44, indicating that both factors are somewhat related, as different information about the fit of the CFA solution. expected since they are hypothesized to be aspects of busi-In this study, the classic chi square (χ^2) is used as an absoness strategy. A correlation of $\emptyset.44$ is also not so strong to lute fit index, the root mean square error of approximation suggest that the two factor measure the same construct. (RMSEA) is used as a parsimony fit index, the compara-Figure 2 presents the graphic input and standardized estitive fit index (CFI) and the Tucker-Lewis index (TLI) are mates for the reduced 7-item model. used as comparative fit indices. These indices are selected, Note that some values of the factor loadings are greater as recommended by Brown (2006), for their popularity alternative models are summarized in Table 6.

than the absolute value of one (Figures1 and 2). The facin the applied research. The goodness of fit indices of the tor loadings are the regression coefficients (Brown, 2006; Harrington, 2009), which are estimated for predicting The CFA on the initial two-factor model (with the 9-items) the observed variables (indicators) from the latent varidid not fit the data well, but was close enough to confirm able. The occurrence of absolute values of standardized the two factor structure. Amos[™] 18 output generated a chiregression coefficients (path coefficients) greater than one square value of 46.763, df (degrees of freedom) =26, and is legitimate although it may lead to a difficult interpretap=0.007 (see Table 6). Following the recommendations of tion. According to Deegan (1978), regression coefficients Brown (2006), fit indices for acceptable model fit should greater than one do indeed occur, particularly with the exhibit values that read: RMSEA close to 0.06 or less; CFI presence of strong multicollinearity. Deegan analytically close to 0.95 or greater; and TLI close to 0.95 or greater, and geometrically demonstrated the legitimate occurrencthe model did not fit well with an RMSEA value of .107, a es of such coefficients values. He argued that the regression CFI value of .939, and TLI value of .915. These values sugcoefficients, as opposed to the correlation coefficients, "are gest that the model may be considered for re-specification; rates of change", which are not "numerically bounded by a decision that basically positions an investigator in an ± 1 " and, therefore, "must have the same direct interpretaexploratory mode because of its data-driven nature (Hartion as all rates of change." (p. 882). Jöreskog (1999) also rington, 2009). Harrington (2009) recommends, when a demonstrated that when factor loadings are regression comodel does not fit, to examine modification indices for efficients (not correlations), they can be larger than the abinvestigating possible improvements and making possible solute value of one in magnitude and suggested that such recommendations for further research. values may be caused by the presence of multicollinearity in the data.

Assessing the Validity of a Small Business Strategy Instrument Using Confirmatory Factor Analysis

Table 7 shows a modification index estimate (MI) and the estimated parameter change (Par change) caused by



the suggested change to the model. There is only one suggestion presented by Table 7; that is, allowing error item 9 and the latent variable BIR to covary. If the suggested covariance were to be included in a re-specified model, the parameter would incur a change of -0.170. The small value (5.392) of the modification index (MI), however, does not necessarily suggest such a change to the model although one may consider relating market expansion strategy (BS9) and business image and reputation (BIR) as reasonable. Harrington (2009) strongly recommends caution with data-driven changes.

Allowing the error for item BS9 to covary with the latent variable BIR resulted in a nested model (Figure 1 presents the parent model) with χ^2 (chi-square) = 39.567, and df = 25. Brown (2006) notes that comparing the γ^2 difference between the parent and nested models allow for testing if modifying the model would affect the fit significantly. The parent model had $\chi^2 = 46.763$ and df = 26. As such, the χ^2 difference is: 46.763-39.567 = 7.196, df = 26-25=1, suggesting that adding the covariance between the error item for BS9 and BIR would improve model fit. In this case the value of the χ^2 difference (7.196) is compared to a critical value for a 1 df test, which is equal to 3.841 (these values are found on statistical tables for critical values of the chisquare distribution). Since the χ^2 difference is greater than the critical value for a 1 df (7.196 3.841), the change is, therefore, considered significant with regard to improving model fit (Harrington, 2009). In addition, RMSEA, CFI,



and TLI indicated a noticeable improvement in model fit rington (2009), the analysis has moved from a confirmawith respective values of Ø.Ø91, Ø.957, and Ø.938 (Table 6). tory mode to an exploratory one; a situation that calls for testing the model with an independent sample (a different Similarly, in an attempt to improve the fit indices to meet et of data).

Brown's (2006) recommendations, a second modification was considered as a result of the modification indices re-The specification of the CFA model on the reduced busiported on Table 8. A covariance between error items BS9 ness strategy scale (7 items) is based on the results of the and BS3 was allowed (market expansion and differen-PCA and reliability analyses, which suggested that the tiation strategies). Once again, the two strategies may be scale is more consistent by dropping items BS1 and BS4 thought to be reasonably related as businesses may con-(respectively pricing leadership strategy and innovation sider penetrating new markets by differentiating their ofstrategy). The specified model is shown on figure 2 disferings from their competitors. Such a model generated a playing values of parameters estimates. The CFA on this χ^2 of 34.415, df = 24, and a desirable p of $\emptyset.\emptyset78$, which is initial model generated a chi-square of 23.796, df = 13, greater than Ø.Ø5 (Table 6). The fit indices for this model and $p = \emptyset.033$ with the following fit indices: RMSEA = satisfied Brown's (2006) recommendations with an RM-0.109, CFI = 0.953, and TLI = 0.924 (Tables 6). This ini-SEA close to Ø.Ø6 (RMSEA= Ø.Ø79), an improved CFI tial solution showed already that a 7-item model fits the value of Ø.969, and a TLI of Ø.954. With such values of data better than the 9-item model. Fit indices generated by the initial CFA on the 7-item model are slightly closer fit indices, the third version of the model (two separate modifications) is considered to be having a good fit. At to Brown's (2006) recommendations than those generated this stage of what started as a CFA, as suggested by Har- by the CFA on the 9-item model. However, with allowing

TABLE 6 Goodness-of-fit indices for alternative models								
ModelRMSEACFITLI χ^2 dfp-value								
Model 1(with the initial 9 indicators)	.107	.939	.915	46.763	26	Ø.ØØ7		
Model 1(first modification)	.Ø91	.957	.938	39.567	25	0.009		
Model 1(second modification)	.Ø79	.969	.954	34.415	24	Ø.Ø78		
Model 2 (with 7 indicators)	.109	.953	.924	23.796	13	0.033		
Model 2 modified	.Ø33	.996	.993	12.896	12	Ø. 377		

TABLE 7MODIFICATION INDEX(MODEL 1- FIRST MODIFICATION)					
			M.I.	Par Change	
error term 9	<>	Strategies for Business Image and Reputation	5.392	17Ø	

TABLE 8. MODIFICATION INDICES (MODEL 1- SECOND MODIFICATION)					
error term		error term	M.I.	Par Change	
9	<>	3	4.690	102	
4	<>	5	4.112	.114	

Table 9 Modification indices (Model 2- reduced 7-item scale)					
			M.I.	Par Change	
error term 9	<>	Strategies for Business Image and Reputation	5.094	.140	
error term 9	<>	error term 2	8.339	.118	

error item 9 and error item 2 to covary (suggested modification with the largest value of MI: see Table 9) would improve the values of the χ^2 to 12.896 with 12 degrees of freedom, and a p-value of .377. In addition, with values of RMSEA = $\emptyset.033$, CFI = $\emptyset.996$, and TLI = $\emptyset.993$ (Table 6), the 7-item instrument with a two factor structure fits the data very well with a single modification added to its specification.

DISCUSSION AND CONCLUSIONS

The purpose of this study was to evaluate a small business strategy instrument in terms of factorial structure and construct validity. The instrument was developed by Cragg et al. (2002) by surveying small manufacturing British businesses. To my knowledge, this is the first study to focus on validating a measure for small business strategy. The CFA results represent an initial ground work for researchers interested in strategic management as it relates to the small business realm. Based on these results, it is recommended that more work is needed to provide the small business environment with a standardized measure of business strategy.

This confirmatory factor analysis confirmed the multidimensionality of the small business strategy instrument developed by Cragg et al., (2002). It also provided a slight support for the 7-item scale over the 9-item one. However, because a number of modifications has been made to the model, this CFA ended as an exploratory analysis (Harringhton, 2009), which needs to be replicated. According to Brown (2006), a model that was revised needs to be reconfirmed in a different sample. Future studies should address a number of issues, including sample size and deeper interpretations of absolute values of loading factors greater than one. Moreover, the relatively small sample size is a limitation for this study, although there is no consensus in the literature on the minimum sample size (Harringhton, 2009). Harrington (2009) states that researchers should not be concerned with the sample size so long the model has few factors and communalities are high; a condition that is fairly satisfied by this study's model as evidenced by the factor analysis section. However, conclusions and findings should be considered with caution as the criteria for comparing models are relative rather than absolute. It should also be noted that CFA is a data-driven analysis and, therefore, a model that fits well a particular data set may not fit a different one. This study is just a first attempt to validate a strategy measure for small business environment.

On the one hand the analysis showed that the instrument's items loaded distinctively on two different factors (dimensions) thereby lending support for discriminant validity. On the other hand, different items loaded sepa-Tabachnick, B. G. & Fidell L. S. (2013). Using multivarirately on a unique factor supporting convergent validity. ate statistics. 6th ed. Pearson In addition, the magnitudes of the loadings present evi-Trochim, W. M. K. (2006). Research method knowledge dence for content validity. The reliability of the measure base. http://www.socialresearchmethods.net/kb/inwas assessed based on Cronbach alpha coefficient. The reduced 7-item scale showed better internal consistency dex.php than the original 9-item; a result that suggests a different Venkatraman, N. (1989b). Strategic orientation of busianalysis with a different data set as the items dropped, to ness enterprises: The construct, dimensionality, and meet reliability assumptions and recommendations, seem measurement. Management Science, 35(8): 942-962. to have a good support in the literature.

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She Has A Nice Personality...Personality Types And Big Data

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ABSTRACT

Big data offers organizations immense opportunities, but the sheer volume of the data and the speed with which it is produced pose equally immense challenges. Different personality types, as described by the Myers-Briggs Type Indicator, may bring different strengths for addressing these challenges. Any given individual may have a preferred personality type, but it is possible to act against type or to develop strengths associated with the opposite of type. Organizations need different and diverse personality types to best deal with the challenges of big data, and individuals who can express not only their preferred personality type, but also strengths of its opposite, are in an ideal position to successfully meet those challenges.

INTRODUCTION

The volume of data created and available to companies is sufficiently massive as to demand attention. The idea that Wal-Mart may be able to acquire 2.5 petabytes per hour (McAfee & Brynjolfsson, 2012) is striking and while it seems reasonable that many people are tweeting frequently, the realization that there are approximately 340 million tweets tweeted daily (Marshall, 2012) or that those daily tweets generate 12 terabytes of data (Gobble, 2013) emphasizes the idea that we live in a world that is full of data.

Authors (Gobble, 2013; Lopez, 2012; McAfee & Brynjolfsson, 2012) seem to agree on three characteristics of big data: (1) the volume of data is huge; (2) the velocity with which data is created is fast; and (3) the variety of data sources is wide. These characteristics represent not only opportunities to learn from the data and to use the data in ways that we do not yet fully understand or foresee, but also challenges to seize these opportunities. The potential to learn more from wider sources of data, to allow for faster responses, and to utilize data with more immediacy, may well justify some of the excitement about big data and the opportunities it affords.

BENEFITS OF BIG DATA AND SKILL SET NEEDS OF BIG DATA

Big data potentially offers tremendous advantages to those organizations best able to make use of it. Enhanced efficiency, increased revenues and improved profitability are suggested results that canny enterprises can achieve through big data (Brown, Chui, & Manyika, 2011; McAfee & Brynjolfsson, 2012). If the lure of big data offers the possibility of big results for organizations, it also appears to offer a potentially large number of career opportunities for capable individuals. Big data seems to require skill sets that are not widely available (Brown, Chui, & Manyika, 2011; Davenport & Patil, 2012; Gobble, 2013). Big data efforts may require not only an understanding of programming and statistics, but also a corresponding ability or willingness to pursue questions that arise (Marshall, 2012). Big data seems to require the ability or skills to compose questions worth asking, to communicate findings, to iteratively review, and to see uses for analyses and results as well as their implications.

An employee of LinkedIn observed that user connectivity had not risen to expected levels and employed available data to proffer suggested connections for users—a meaningful contribution to growth (Davenport & Patil, 2012). This was accomplished in an unconventional manner that required not only extensive exploration of available data, but also the willingness to continue despite early lack of interest from some co-workers (Davenport & Patil, 2012). This example suggests that there may be enhanced career opportunities for those people who are willing and able to take a broader view of potential questions, ideas, or opportunities (McAfee & Brynjolfsson, 2012) and then implement them. This observation seems analogous to some of the dimensions captured by the Myers-Briggs Type Indicator. Consequently, this paper explores the idea that developing strengths and skills associated with the opposite of type for desired dimensions may encourage people to improve those skills needed for working with data as an organizational asset. Stated more simply, might persons of a given type benefit from developing strengths of the opposite type, potentially enhancing their opportunities in the world of big data?

MYERS-BRIGGS TYPE PRIOR RESEARCH

The Myers-Briggs Type Indicator is a tool for classifying individuals by their dominant personality types. There are four dimensions, each described by a letter representing the preferred or dominant characteristic of an opposing pair: (1) Extraverted versus Introverted, (2) Sensing versus iNtuition, (3) Thinking versus Feeling, and (4) Judging versus Perceiving. Each letter associated with the four types has associated characteristics and strengths, and no combination or type is considered universally superior. This paper focuses on the S/N and J/P dimensions in particular, as those dimensions may be more immediately applicable to information systems generally and big data specifically. (Gardner & Martinko, 1996; Healy & Woodward, 1998; Karn, Syed-Abdullah, Cowling, & Holcombe, 2007; Passmore, Holloway, & Rawle-Cope, 2010; Pittenger, 2005)

The sensing-intuition dimension relates to information intake and analysis. If sensing people prefer to have concrete-type facts and details, then intuitive people are interested in potential and broader views (Bishop-Clark & Wheeler, 1994; Gardner & Martinko, 1996; Healy & Woodward, 1998; Karn, Syed-Abdullah, Cowling, & Holcombe, 2007; Passmore, Holloway, & Rawle-Cope, 2010). "People are inclined to attend either to the immediate, practical, and observable, or to future possibilities and implicit or symbolic meanings" (Healy & Woodward, 1998). Passmore, Holloway, and Rawle-Cope (2010) comment on the S/N dimension, observing that Ss focus on the "concrete, detailed, and practical" while Ns "are more content to tolerate ambiguity and prefer the big picture." Those same authors suggest of the J/P dimension that Js

prefer organization and structure, while Ps prefer flexibility and spontaneity (Passmore, Holloway, & Rawle-Cope, 2010). Within the S/N dimension, observable differences can be seen between Ss and Ns in terms of their decision making process and preferred measures, with Ns embracing abstraction while Ss choose to interact with raw data more directly (Gardner & Martinko, 1996). Further, Ss may be more "conservative and risk averse" while the "more holistic outlook of Ns helps them consider relevant opportunity costs" (Gardner & Martinko, 1996).

The J/P dimension classifies dichotomous personality types by preferred mode of judgment. "People tend to either control their lives in a very organized, planned, expeditious way, making quick and final decisions, or they adapt to life spontaneously through constant information-seeking and inquiry while keeping their options open" (Healy & Woodward, 1998). Within the J/P dimension, Js and Ps may also approach management tasks differently. Js favor a controlled environment, while Ps are less deliberate and less concerned with routine (Gardner & Martinko, 1996). "Js' behavior is planned and methodical, while Ps are more creative and spontaneous" (Gardner & Martinko, 1996).

Further, combinations of certain dimensions may have a synergistic effect. For example, Gardner & Martinko (1996) observe that "when N's conceptual abilities are combined with P's open-mindedness and flexibility, enhanced creativity often results". As Js "tend to be goal oriented and decisive," while Ps are "more curious and explorative" (Healy & Woodward, 1998), both types bring important skills to a given hypothetical task. To maximize the likelihood of success in certain tasks, different personality types must work together, or individuals must be able to express both personality types, regardless of which they favor.

It is not surprising that certain professions tend to be correlated with certain personality types. While samples suggest that 60 percent of the United States' population at large have a SJ preference, among managerial samples TJs tend to dominate (Gardner & Martinko, 1996). Gardner & Martinko (1996) explored the proportion of personality types expressed by managers, finding that "Ns are predominant among top managers, while Ss are most common in samples of middle and lower level managers." They propose that either Ns are disproportionately promoted due to their "strategic and holistic thinking," or that "top executives' responsibilities may cause them to develop their intuition more fully." (Gardner & Martinko, 1996). The latter possibility is particularly interesting, as it enforces the proposition that personality type is not inflexible. Individuals can successfully employ and nourish traits more associated with their dominant personality type's opposite. While individuals are most comfortable trying to develop strengths associated with the personalwhen acting as their preferred type, "this does not mean ity characteristic that they do not dominantly express in a that they are unable to develop behaviours associated with dimension of their MBTI. Gardner and Martinko (1996) their non-preference. People can be effective at using their also pose questions relating to how activities and experience help develop some of these strengths. Do people have non-preference, it just takes more time and energy to do certain types throughout their career or do they develop so..." (Passmore, Holloway, & Rawle-Cope, 2010). the skills they need to help them advance in their career progression? Are people's types impacted by the needs of **DEVELOPING AGAINST TYPE** their current career stage or did they have these characteristics all along? If people are actually developing skills Given the potential opportunities and rewards for indiof their opposite-of-type traits and characteristics as they need them, then the question suggests the follow-up question: how can one more efficiently or more easily develop against type?

viduals and organizations that may arise from big data, it is worthwhile to consider how individuals can develop skills to improve their ability to utilize big data. If big data is bigger, faster, and more widely distributed than in the past, the skills needed to better utilize that data Intraverts who have not developed strengths associated with extraversion risk that others may not always understand what the intravert is attempting to communicate (Myers & Myers, 1980, Kindle locations 479-483). The impact for those engaged in big data initiatives may be that they fail to express what they are hoping to accomplish through their efforts and the potential impacts to their organization. Additionally, if big data involves making use of data from a potentially large variety of data sources, this problem could lead to lack of knowledge of data sources that may offer valuable information or the ability to increase the value of related data from other sources. Some intraverts "... may have difficulty in conveying their conclusions to the rest of the world and getting these accepted or understood." (Myers & Myers, 1980, Kindle locations 1510-1513). With respect to big data efforts, this could impact the ability of an organization to realize possible opportunities or solutions to problems that an intravert may develop or find. Extraverts who fail to develop strengths associated with intraversion may overlook important ideas (Myers & Myers, 1980, Kindle location 875). This failure to grasp significant concepts could lead to misunderstandings of problems or potential opportunities - solving the wrong problem, failing to understand a relationship between data elements or how certain data may relate to a problem or opportunity. Given the example with LinkedIn (Davenport & Patil, 2012), intraverts may be more willing to persevere when given little encouragement or support (Myers & Myers, 1980, Kindle locations 894-896). This strength may be particularly important in pursuing potential ideas during early stages of problem solving or identifying a potential opportunity using data initiatives.

may be disparate, or even contradictory. Great insights may generate correspondingly great payoffs from big data if individuals can combine the 'big picture' and strategic thinking abilities to identify worthwhile questions and possibilities, with the processes and details to generate the analyses required to find and understand the important or valuable implications in the data. This would suggest that valuable contributions can be made by both sensing and intuitive types. If big data is faster than ever before and increasingly real time, does that mean that people involved in big data efforts will benefit if they can combine outcome-orientation and scheduling discipline with flexibility and open-mindedness to continue to consider additional possibilities and unforeseen opportunities? It may be that it becomes important to find a way to merge these disparate perspectives into a single, more iterative perspective that combines frequent results with a willingness to sometimes insist on waiting so that particularly promising leads can be pursued. This iterative outlook would incorporate or include both judging and perceiving characteristics, requiring both personality types to be represented, at least in part. People need to develop their non-preferred preference so that they have the support of the opposite of type (Myers & Myers, 1980, Kindle locations 435-439). Myers & Myers (1980, Kindle locations 457-459) point out that introverts, in particular, will suffer if they do not develop some of the characteristics associated with extraversion. One analogy that Myers & Myers use is that the nonpreferred part of a pair should serve to help the preferred (1980, Kindle location 475). It is important to remember that if people do not develop strengths associated with the opposite of their preferences they are not addressing Thinking versus feeling might initially seem to have their limitations. As Myers and Myers (1980, Kindle lolittle to do with the subject of big data. However, Myers cations 1991-1992) note "Jones is not merely weak where & Myers (1980, Kindle locations 1079-1083) point out Smith is strong: Jones is also strong where Smith is weak." that thinkers who have failed to develop strengths associ-Gardner and Martinko (1996) suggest that it is possible to ated with feeling may be unable to secure the cooperation 'develop against type' and that individuals may benefit by or support of others to help with their initiatives. If big data initiatives require that others explain organizational challenges or data that is potentially available to support these intiatives, thinkers with underdeveloped feeling strengths may have to work harder with less or miss out on the opportunity to solve important problems due to their inability to secure the support of others. Additionally, others may impede or hamper their efforts due to lack of interest. The thinking preference has strengths as well. For example, "... thinking may be used to check for possible flaws and fallacies." (Myers & Myers, 1980, Kindle location 1099). If the thinking preference seeks "objective truth" (Myers & Myers, 1980, Kindle location 1071), that ability to focus on pursuing answers may assist thinkers in seeking solutions to problems or opportunities through big data. Myers and Myers (1980, Kindle location 1767) assert that feeling "... is no help with analysis." Clearly those with a thinking preference will be more successful with big data efforts if they develop strengths associated with the feeling preference, and those who prefer feeling can improve their likelihood of success if they develop the strengths related to the thinking preference.

For this paper, our primary focus relates to the sensing-intuition dimension and the judging-perceiving dimension. The greater challenge should be to encourage changes in information detail--big picture versus detailed thinking. However, the payoffs in terms of ability to identify valuable opportunities from data should be more than worth any 'temporary growing pains' involved. The ability to grasp the implications of a wide range of possibilities-new sources of data or new relationships among data that might not have been previously recognized--along with the skills needed to experiment with data, offers opportunities that could be easily overlooked. The ability to identify potential opportunities to implement changes that utilize information gained from big data efforts suggests Karn, J. S., Syed-Abdullah, S., Cowling, A. J., & Holthe need for openness to unexpected or unforeseen ways to use results with an ability to understand the analyses that are created.

It may be easier for individuals to develop against type with respect to the judging-perceiving dimension. En- Lopez, J. A. (2012). Best Practices for Turning Big Data couraging a change to a beta mindset may help lead to shorter delivery times and closure while reviewing results from an iteration could help encourage consideration of additional exploration of newly emerging possibilities. One possibility is for judging types to try to consider big data efforts as a series of small projects instead of an ongoing large project. Perceiving types could try to convert to a beta release mindset with frequent project deliverables.

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