



Data analytics in auditing: Opportunities and challenges



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Abstract In this article, I provide background regarding a hot topic in the public accounting profession: the rise of big data and the related field of data analytics (DA). The tax and advisory practices of public accounting firms have embraced the use of DA, and firms have made significant investments in growing these practice areas. Although DA holds great promise for the auditing practice as well, the use of widespread DA on audit engagements has lagged behind other practice areas. This is due to the fact that auditing presents unique challenges in the adoption of DA that are not relevant for other practice areas. Despite the impression that DA is not being embraced as readily in auditing, public accounting firms are continuing to make significant investments in developing audit-related DA, and it is only a matter of time before we start to see the transformational impact of these efforts. The purpose of this article is (1) to explain how DA applies to financial statement audits and why it could represent a game changer in how audits are conducted, and (2) to provide a context for researchers in terms of problems to be addressed related to DA.

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1. Data analytics: A game changer for public accounting

The term *big data* and the related approaches to analyzing data, often referred to as *data analytics* (hereafter, DA) or *predictive analytics*, have been discussed at length in the popular press and academic journals—to the point of oversaturation in recent years. University programs have been

developed to address DA competencies, seemingly overnight (Briggs, 2013). Indeed, at the American Accounting Association (AAA) annual meeting in August 2014, a panel session co-sponsored by PricewaterhouseCoopers and the University of Illinois was held to discuss how the accounting curricula must adapt to incorporate more data analysis courses (PwC, 2015). The message of the panel was that in order for students to be competitive in both audit and tax, they must learn to become data scientists. Big data is seen as the wave of the future in business, and any organization that falls behind in its development of DA capabilities is expected to lag

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its competitors and could experience dire consequences to the bottom line. In a recent survey of CFOs and CIOs conducted by [KPMG \(2014\)](#), 99% of respondents noted that data and analytics is at least somewhat important to their business strategy, and 96% expressed that they could make better use of big data within their organizations. Service organizations, such as public accounting firms, are in the race to provide better and more comprehensive DA services to their clients, but the question still remains as to how they will actually accomplish this. Another question is whether the core business of public accounting—that is, auditing—will benefit from an investment in DA capabilities or whether DA is ultimately more in the domain of consulting.

The purpose of this article is (1) to explain how DA applies to public accounting firms and why it could represent a game changer in how audits are conducted, and (2) to provide a context for researchers in terms of problems to be addressed related to DA. The potential of DA to improve the practice of auditing is quite significant, but there are many challenges that need to be overcome before widespread use of DA in auditing becomes a reality. The role of DA in auditing has been discussed in several recent academic articles (e.g., [Alles, 2014](#); [Alles & Gray, 2014](#); [Brown-Liburd, Issa, & Lombardi, in press](#)), but many of these are thought pieces, the purpose of which is to develop frameworks for approaching the literature related to DA (e.g., [Alles & Gray, 2014](#)) and provide specific research questions that can be addressed in future studies (e.g., [Brown-Liburd et al., in press](#); [Gray & Debreceny, 2014](#); [Wang & Cuthbertson, in press](#)). The Emerging Assurance Technologies Task Force of the AICPA Assurance Services Executive Committee (ASEC) has also authored a white paper describing in great detail how DA could be used on audits ([AICPA, 2014](#)). Despite an interest in DA by academics, empirical academic research related to DA in auditing is still in its infancy, due in part to the lack of information being provided by public accounting firms about their approaches to DA. This article will discuss broad areas of emphasis intended to drive research questions related to DA that are of interest to public accounting firms, users of financial statements, and regulators.

This article is organized as follows. Section 2, which appears next, provides an overview and defines big data—and related DA—in general. Section 3 discusses DA in the context of public accounting firms for all three service lines of audit, tax, and consulting. Section 4 discusses the benefits of DA within auditing in particular. Section 5 discusses the challenges of adopting DA in auditing. Section 6 explores how academic research can inform the

adoption of DA in auditing. Finally, Section 7 provides an overall conclusion.

2. What are big data and data analytics?

Big data has been defined as “high-volume, high-velocity, and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision-making” ([Gartner, 2013](#)). The characteristics of volume, velocity, and variety, which describe the features that make big data unique, are often referred to as the Three Vs of big data ([Alles & Gray, 2014](#)). However, as Gartner explains, big data must be analyzed or processed in an innovative way in order to be relevant and useful for decision making. Indeed, big data as a concept is often discussed in conjunction with analysis of the data. For example, as noted by [Alles and Gray \(2014\)](#), big data in the accounting literature is often defined by the types of analysis that can be performed *with* the data, such as DA or predictive analytics, rather than as a type of data source. In addition, the source of the data can vary. [Alles and Gray \(2014, p. 5\)](#) note specifically:

To auditors, the *data* in (or contents of) big data refers to collections of multiple types of data, which could include some mix of traditional structured financial and non-financial data, logistics data, sensor data, emails, telephone calls, social media data, blogs, as well as other internal and external data.

The availability of large amounts of computerized data in companies has been steadily increasing over the years, but recent advances in processing speed, cloud storage, and the rise of social networks has changed the ease of access to data and the nature of data that can be captured and stored for later use. At the same time, software used to analyze large volumes of data (i.e., data mining tools) as well as more sophisticated data visualization tools can potentially increase the ability of individuals to understand the story that the data is telling them ([AICPA, 2014](#); [Capriotti, 2014](#); [Whitehouse, 2014](#)). DA approaches are very similar to the methods used by academic researchers in conducting empirical research. [Crawley and Whelan \(2014\)](#) acknowledge the overlap between DA techniques and academic research, and discuss how academic researchers could expand their use of DA techniques to enhance and improve the types of research questions they can address. In DA, as in academic research, large amounts of data are collected and tested to ensure

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