

Measuring the Effect of Digitalization Efforts on Bank Performance*

Johannes Kriebel

Joern Debener

University of Muenster[†]

University of Muenster[‡]

March 24, 2020

Keywords: Digital transformation, banking, text mining, firm performance

JEL Classification: G21

1 Extended Abstract

The ongoing digitalization, referring to the increased use of digital technologies within organizations, fundamentally changes the way companies operate and the way goods and services are produced and marketed. It is, therefore, of major importance to researchers and practitioners alike to understand how digitalization efforts affect the financial performance of companies.

Hence, there is a comprehensive literature studying the business value of digital technologies. Early studies focus on the relationship between IT and productivity (Solow, 1987, Brynjolfsson, 1993) and eventually find a positive impact of IT (Lichtenberg, 1995, Hitt and Brynjolfsson, 1996). However, when these technologies are available to all competitors, an increase in productivity does not necessarily translate into an increase in profitability. How digitalization efforts affect the financial performance, therefore, ultimately is a question of whether barriers to market entry exist or whether certain resources to use technologies can provide competitive advantage (Hitt and Brynjolfsson, 1996 and Bharadwaj, 2000).

*We would like to thank Martin Hibbeln for helpful comments and suggestions. We are also grateful to Andreas Pfungsten and other members of the Finance Center Münster for their valuable feedback.

[†]Corresponding author, Universitätsstraße 14-16, 48143 Münster, Germany, johannes.kriebel@wiwi.uni-muenster.de, phone +49-251-83-22692, fax +49-251-83-22882

[‡]Universitätsstraße 14-16, 48143 Münster, Germany, joern.debener@wiwi.uni-muenster.de, phone +49-251-83-22879, fax +49-251-83-22882

Many studies consequently struggle to find a positive relationship between investments in IT and the financial performance of firms (Aral and Weill, 2007, Beccalli, 2007, Wang, 2010). In line with a resource-based view on digitalization, some authors find that not digitalization investments itself but the capability to successfully use digital technologies generates a sustainable competitive advantage for companies (Bharadwaj, 2000, Santhanam and Hartono, 2003, Devaraj and Kohli, 2003, Aral and Weill, 2007). In contrast, other authors argue that IT may have been a scarce resource in the 1990s, but since then has become a commodity that is available to all market participants and, therefore, does not lead to a higher profitability (Carr, 2003, Chae et al., 2014). Whether IT increases the financial performance of companies, hence, remains unclear.

While this is a question with crucial practical relevance, studying this issue suffers from a common problem: There is a lack of reliable data on digitalization investments and the digital capability of companies (Beccalli, 2007, Chae et al., 2014). Therefore, most of the studies rely on self-reported survey data (Bharadwaj, 2000, Santhanam and Hartono, 2003, Aral and Weill, 2007, Beccalli, 2007, Chae et al., 2014). This represents a strong limitation for research on the impact of the digital transformation.

As our main contribution, we address the issue of measuring companies' digitalization efforts and their digitalization capability. Our research approach is to use text mining methods to extract the respective information from the annual reports of all US banks listed on the New York Stock Exchange. We develop two measures: The first measure is a frequency based assessment of common digitalization keywords in these reports. The intuition behind this measure is that a bank will report digitalization aspects more extensively when it makes more efforts and invests more in them. This is related to Bellstam et al. (2019) and Wang (2010) who show that information on innovation and digitalization investments, respectively, can be extracted from analyst reports and newspapers. We validate the measure in two ways: In a first step we analyze its relationship with personnel expenses. In a second step, we look at its relationship with IT patent filings based on data available from the United States Patent and Trademark Office. As a second measure, we evaluate the sentiment of the context in which the digitalization terms are reported. The intuition here is that a bank will report digitalization aspects more positively when it is more capable in building up and managing these resources, which should allow competitive advantage based on the resource-based view of the firm.

As our second contribution, we add to the strand of literature on the impact of digitalization investments on banks. Although digitalization investments are of great importance to banks and are intensively used in their business processes, the empirical literature explicitly addressing the relationship between digitalization and bank performance is rather sparse and indecisive (Berger (2003), Beccalli, 2007, Hernando and Nieto, 2007).

In line with many previous studies, we do not find a positive effect of digitalization efforts on the profitability. When evaluating the context of the digitalization terms, a positive reporting of digitalization aspects coincides with an increased financial performance. With regard to this second measure, we find evidence that links the resource-based view of the firm to explanations of the IT profitability paradox. This is in favor of competitive advantages resulting from a higher digitalization capability within banks.

References

- Aral, S. and P. Weill (2007). IT assets, organizational capabilities, and firm performance: How resource allocations and organizational differences explain performance variation. *Organization Science* 18(5), 763–780.
- Beccalli, E. (2007). Does IT investment improve bank performance? Evidence from Europe. *Journal of Banking & Finance* 31(7), 2205–2230.
- Bellstam, G., S. Bhagat, and J. A. Cookson (2019). A text-based analysis of corporate innovation. *Working Paper*.
- Berger, A. N. (2003). The economic effects of technological progress: Evidence from the banking industry. *Journal of Money, Credit and Banking* 35(2), 141–176.
- Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, 169–196.
- Brynjolfsson, E. (1993). The productivity paradox of information technology. *Communications of the ACM* 36(12), 66–77.
- Carr, N. (2003). IT doesn't matter. *Harvard Business Review* 81(5), 41.
- Chae, H.-C., C. E. Koh, and V. R. Prybutok (2014). Information technology capability and firm performance: contradictory findings and their possible causes. *Mis Quarterly* 38(1), 305–326.
- Devaraj, S. and R. Kohli (2003). Performance impacts of information technology: Is actual usage the missing link? *Management science* 49(3), 273–289.
- Hernando, I. and M. J. Nieto (2007). Is the internet delivery channel changing banks' performance? The case of Spanish banks. *Journal of Banking & Finance* 31(4), 1083–1099.
- Hitt, L. M. and E. Brynjolfsson (1996). Productivity, business profitability, and consumer surplus: Three different measures of information technology value. *MIS Quarterly* 20(2), 121–142.
- Lichtenberg, F. R. (1995). The output contributions of computer equipment and personnel: A firm-level analysis. *Economics of Innovation and New Technology* 3(3-4), 201–218.
- Santhanam, R. and E. Hartono (2003). Issues in linking information technology capability to firm performance. *MIS quarterly*, 125–153.
- Solow, R. M. (1987). We'd better watch out. *New York Times Book Review* 36.
- Wang (2010). Chasing the hottest IT: Effects of information technology fashion on organizations. *MIS Quarterly* 34(1), 63–85.