

# **DIGITALIZATION IN THE FINANCIAL INDUSTRY: A CONTINGENCY APPROACH OF ENTREPRENEURIAL ORIENTATION AND STRATEGIC VISION ON DIGITALIZATION**

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## **Abstract**

*Technology is rapidly changing the financial industry. Banks, in particular, are faced with a shift from traditional, interpersonal forms of service to digital financial services. These digital technologies are more and more becoming today's standard in the banking sector, they challenge traditional business models, and they provide opportunities for banks to capitalize on. Building on the concept of entrepreneurial orientation (EO), this study of banks in Germany, Switzerland, and Liechtenstein aims at developing insights that explain how banks can use the tactics and strategies associated with EO to achieve superior performance in the digitalization age. The results from a survey in 102 banks show that: 1) banks that display high levels of EO report a higher level of performance, and 2) the relationship between a banks' strategic vision on digitalization, and performance is moderated by EO. These results indicate that the sheer level of the digitalization of a bank does not affect profitability. Instead, in this time of technological change banks should develop a clear vision on digitalization that is characterized by innovation, being ahead of the competition, and a willingness to take risks.*

**Keywords:** *Digitalization, Entrepreneurial Orientation, Financial Service Firms, Performance*

## 1 Introduction

Due to rapid technological advancement, financial service firms in general and the banking industry, in particular, increasingly move towards online and digitalized value generation. As a result, many aspects such as hybrid customer interaction (Nüesch *et al.*, 2015), network competition (Alt *et al.*, 2015), sharing economy-driven services (Richter *et al.*, 2017; Uzunca *et al.*, 2018), or the use of blockchain technologies (Saber *et al.*, 2018) can be found as novel opportunities in the information systems (IS) research agenda. Concepts like ‘direct banks’, ‘crowdfunding’, or ‘cryptocurrency’ are gaining momentum and create pressure for traditional banks (e.g., Bouncken *et al.*, 2015; Richter *et al.*, 2015), especially in countries with a long banking tradition (e.g., Switzerland), to modify their business models. Hence, ‘digitalization’, which is implementing digital technologies (Setia *et al.*, 2013), is vital to overcome time and place restrictions that customers no longer accept (Sachse *et al.*, 2012). The trend of digitalization in the banking sector is particularly evident in Scandinavian countries. At present, online banking penetration rates in Norway, Finland, and Denmark are at 93%, 89%, and 89% respectively (Statista, 2019). In Eastern Europe (e.g., Bulgaria, Romania), online banking penetration rates are only at 7%, while countries like Germany and Austria are currently making the transition to online banking and have penetration rates of about 59% (Statista, 2019). Thus, it seems that the challenge of digitalization has been accepted differently by banks operating in different countries. However, no research has investigated the banks’ inherent ability to take up digitalization as a cause for its adaption and ability to generate new revenues in times of technological change.

Extant research suggests that when firms are faced with uncertain and unique challenges, they benefit from an entrepreneurial response (Covin and Slevin, 1989; Kraus *et al.*, 2012; Ferreira *et al.*, 2019). In established organizations, such an entrepreneurial response is likely to originate from the entrepreneurial orientation (EO) of a firm, i.e. the willingness to engage in, and the strategic orientation of, a firm towards innovation, proactiveness, and risk-taking (Covin and Lumpkin, 2011; Covin *et al.*, 2020). However, for banks that are in the process of making the transition to digitalized value generation, i.e., capitalizing on the arising opportunities from technological change, the benefits of a more entrepreneurial approach are not clear-cut (Kraus *et al.*, 2019a). The design, use, and perceived usefulness of digital services such as online banking tools are not generally agreed upon by clients and elderly clients in particular (Holzinger *et al.*, 2007), meaning that a more conservative approach might be equally or more profitable for the bank than an entrepreneurial one. In addition, Banker *et al.* (2009) provide preliminary evidence that the introduction of online services increases cost efficiency but not sales efficiency per se. So far, traditional channels are not only associated with higher costs but they also provide higher sales, and therefore, they can still lead to an overall positive effect. Especially in countries that are still making the transition to online banking, banks that decide to postpone digitalization may remain (equally) successful in terms of profitability.

We suggest that not solely the level of digitalization but also the extent to which banks ‘embrace’ digitalization strategically and seize opportunities in the marketplace is crucial to achieving a competitive advantage. Banks can develop a vision on digitalization and introduce consistent packages or new online services as part of their business strategy or they can operate without such a clear vision. In addition, they can take different approaches to digitalization, which can be characterized by different levels of entrepreneurial intensity. A non-entrepreneurial approach to digitalization in banks would be one that is typified by a ‘wait and see’ posture with which banks implement services and online features that have proven to be successful (Covin and Slevin, 1989). An entrepreneurial approach to digitalization (Kraus *et al.*, 2019a), in contrast, would be to introduce innovative online services ahead of the competition (Lumpkin and Dess, 1996), while accepting that such services might not result in additional sales, profitability, and/or customer satisfaction.

This study aims to answer three questions: 1) Is an entrepreneurial approach to digitalization successful within the banking sector? 2) Is the success of an entrepreneurial approach within the banking sector dependent on the existing level of digitalization? 3) Do firms need to develop a coherent vision on digitalization? To answer these questions, we investigate the influence of EO within the banking sector in relation to digitalization efforts by banks. We collected data on EO, digitalization, the strategic vision on digitalization (SVD), and performance in the banking sectors of Germany, Switzerland, and

Liechtenstein. These countries all have a strong banking sector and high internet penetration rates, and they are currently making the transition to digitalized banking (see Statista, 2019). We use contingency theory (Drazin and Van de Ven, 1985; Hofer, 1975) to theorize how favorable returns in terms of firm performance might occur when the strategic apex of a local bank has a clear vision on digitalization combined with high levels of entrepreneurship and digitalization in general. By doing so, our study contributes to our understanding of idiosyncrasy in digitalization and firm performance during times of technological change in the banking sector. That is, how can banks capitalize on the market and technological opportunities that digitalization bring about by leveraging strategies that are characterized by innovation, being ahead of the competition, and a willingness to take risks. Our results show that neither a SVD nor the level of digitalization itself improves firm performance. Instead, an entrepreneurial strategic posture needs to be carefully aligned with the banks' SVD to optimize performance.

## 2 Literature Review

### 2.1 Entrepreneurial Orientation

The concept of EO refers to the decision-making styles, practices, and behaviors of managers that lead to new business development in new or established markets with new or existing goods or services (Lumpkin and Dess, 1996; Wiklund and Shepherd, 2003; Rigtering *et al.*, 2017). The most common conceptualization of EO has been advanced by Miller (1983) and Covin and Slevin (1989) and denotes the strategic orientation of the strategic apex of a firm towards innovativeness, proactiveness, and risk-taking. Innovativeness refers to novel and creative processes and the development of new ideas through experimentation (Lumpkin and Dess, 1996). Proactiveness refers to “seeking new opportunities which may or may not be related to the present line of operations, introduction of new products and brands ahead of the competition and strategically eliminating operations which are in the mature or declining stage of the life cycle” (Venkatraman, 1989, p. 947). Risk-taking is used to describe the uncertainty that follows when top-managers or firms behave entrepreneurially. Since its introduction, EO has become one of the most dominant research streams within entrepreneurship research (Covin and Lumpkin, 2011) with studies conducted in various cultural contexts (e.g., Antoncic and Hisrich, 2001; Hughes *et al.*, 2007; Semrau *et al.*, 2016) and industries (e.g., Lee and Lim, 2009; Rigtering *et al.*, 2013), for a large part with a positive relationship towards business performance.

The theoretical roots of EO can be traced back to upper echelon theory (Hambrick and Mason, 1984), which suggests that firms, over time, become a reflection of their top management (teams). Indeed, the strategic apex of a firm has the largest impact on key decisions such as: which market to enter, which technologies to invest in, and what type of service levels to provide (Hambrick, 2007; Eggers *et al.*, 2017). However, actors at different organizational levels can initiate and perform entrepreneurial actions on behalf of the organization (Covin and Slevin, 1991; Wales *et al.*, 2011). As such, EO is commonly understood as a combination of the disposition of the top management (team) towards entrepreneurship and the behaviors of organizations that can be defined as entrepreneurial through their emphasis on proactivity, innovativeness, and risk-taking at the firm and managerial level (Covin and Lumpkin, 2011; Covin and Wales, 2012).

EO, as an organizational-level construct (Covin and Slevin, 1991; Wales *et al.*, 2020), represents a forward-looking orientation that favors innovation and risk-taking behavior. The outcomes of EO are not always positive and can also result in failure and, in more extreme cases, bankruptcy (also see Wiklund and Shepherd, 2011). To understand under which conditions EO leads to firm performance, foundational EO studies (e.g., Covin and Slevin, 1989; Covin and Slevin, 1991; Lumpkin and Dess, 1996) have built upon contingency theory (Burns and Stalker, 1961). Contingency theory suggests that the fit among key variables is key for obtaining high levels of firm performance (Donaldson, 1995). Elements such as structure, strategy, resources, and the external environment have all been identified as important contingency factors that moderate the EO – performance relationship (see Lumpkin and Dess, 1996). The external environment, however, is commonly seen as one of the most critical contingency

elements and includes “those forces and elements external to the organizational boundaries that affect and are effected by an organizational action” (Covin and Slevin, 1991, p. 11). As EO research is rooted in entrepreneurship theory, organizations that respond in an entrepreneurial manner to dynamic conditions and (technological) change are expected to engage in innovation, creative destruction (Schumpeter, 1934), and, as a result, to obtain superior firm performance and growth. The basic prediction from contingency theory that the benefits of EO are dependent on the type of operating environment has been tested in numerous studies. Covin and Slevin (1989), for example, show that EO is of particular relevance in hostile environments. In those environments, firms have to be innovative to stay ahead of the competition and cannot rely on existing sources of competitive advantage, as those advantages may quickly disappear. Under such conditions, the benefits of an entrepreneurial approach outweigh the risks. When it comes to the effect of technology, EO bears value in both high-tech and non-high-tech industries. However, in high-tech industries characterized by technological change, the effect of EO on firm performance is usually stronger.

## **2.2 Entrepreneurial orientation in the financial service industry**

Only a few articles have studied the role of EO within the financial service industry. Richard et al. (2004; 2009) focus on how the characteristics of the top management team of a bank affect the EO–performance relationship. Next to a direct relationship between EO and performance, their findings suggest that the industry tenure of a CEO, and diversity in the top management team, positively moderates the relationship. However, the position tenure of a CEO moderates the EO – performance relationship in a negative way. George and Khan (2001) take a different approach and show that EO has a positive effect on the networking strategy of a bank. As such, EO affects the competitive advantage of a firm by creating integrated networking arrangements with strategic customers and suppliers (Larson, 1990). This resonates with Auger et al. (2003) who show that EO has a positive effect on “the processes of sharing business information, maintaining business relationships, and conducting business transactions by means of the internet” (p. 140). To summarize, previous research on EO in the financial service industry indicates that networking intensity with customers and suppliers, as well as firm performance, are fostered by EO.

## **2.3 Digitalization in the financial service industry**

Digital technologies are increasingly affecting innovations (Kauffman *et al.*, 2015; Vermeulen, 2004), customer relations, business relationships, and IT (Kraus *et al.*, 2019a; Kraus *et al.*, 2019b), particularly in industries such as the financial service industry where a shift to online services is happening (Setia *et al.*, 2013). Financial service firms must react to the change in behavior and customers’ needs. Large banks, in particular, are still focusing on efficient transfer systems and cost strategies, instead of adapting their services to digitalization (Tallon, 2010). In a first attempt to address this lack of advanced customer service, Pole et al. (2011) developed a classification tool for web 2.0 applications in private banking. This tool investigates possible applications, potential risks, and the general importance of web 2.0 applications. Findings of Nüesch et al. (2012) confirm that banks are just starting to explore the opportunities of digital services and to develop closer and more trustful customer relations. Most banks are only providing basic services such as instant messaging, wikis, blogs, and rating-applications. This keeps costs to a minimum but jeopardizes business potential to acquire new customers, to intensify customer relationships, and to gain customers’ loyalty to offer cross-selling products. Möwes et al. (2011), therefore, label this trend to use web 2.0 technologies as an ‘interactive aspect’ of banking.

Further opportunities to intensify customer relations by the use of digital technologies are integral banking, multi-functional banking, and mobile banking (Sachse *et al.*, 2012). ‘Integral’ banking provides the customer with greater transparency. Customers are able to retrieve the same information that is available to the bank advisor. A key advantage of multi-functional banking is the possibility to use different tools such as computers, phones, and local banks for banking. In a similar manner, mobile banking mostly refers to the possibilities to use banking services through mobile devices, being independent of time and place restrictions. Customers expect banks to provide their services electronically, while still relying on personal contact when needed (Sachse *et al.*, 2012). In addition, Setia et al. (2013) show that information quality directly affects customer service efforts and perception.

The ability to provide appropriate services to customers (Slater and Narver, 1994) and to respond to customer needs (Eggers and Kraus, 2011) proves to be key qualities of perceived customer service (Fornell *et al.*, 1996). In this relationship, digital technologies can be a useful means to improve customer service (Setia *et al.*, 2013).

Concerning changes in business relationships, institutional investors use, for example, algorithmic trading, 'intelligent' order routing-techniques, or direct market access (DMA) (Ende, 2010). These technologies allow for independent trading and mean lower costs for institutional investors. Control of trading, urgencies, and anonymity are further intentions that motivate institutional investors to apply these techniques. Consequently, classic brokers become of less use. Also, E-brokers provide self-service placement costs, such as transaction processing costs, for a lower price than classic brokers do. This development will likely change the business models of brokerages (Bakos *et al.*, 2005). This change in business relationships can also be observed at stock exchanges. Digital trading platforms change the relevance of established stock exchanges (Lucas *et al.*, 2009). Suppliers have to radically change or adapt new business models to survive. Digital technologies allow for new business models, which enable people to pursue loan transactions through online platforms and change the way in which banks and credit institutions must act (Matt *et al.*, 2016; Saberi *et al.*, 2018). Originally, their competence was to act as intermediaries. Now, 'open point banking' has appeared as a new term (Möwes *et al.*, 2011). Non-banks start to compete with traditional actors in the financial service industry. A study of 'digital natives' (Sachse *et al.*, 2012) showed that already half of the respondents show interest in using the services of these non-banking institutions. This finding shows the tendency in the market towards a more heterogeneous market with increasing disintermediation of banks (Sachse *et al.*, 2012).

IT changes the interaction between users and technique: information is increasingly digitized (Granados *et al.*, 2006). Customers are not relying on local bank offices anymore to use banking services; the competition of financial investors changes from the trading floor to an electronic emporium (Lucas *et al.*, 2009). Humans no longer compete only with each other anymore, but now they must also compete with challenging technological innovations, such as high-frequency or algorithmic trading, which encompasses "the use of computer algorithms to automatically make trading decisions, submit orders, and manage those orders after submissions" (Hendershott *et al.*, 2011, p. 1). High-frequency trading is part of algorithmic trading, but is more complex and focuses on the speed of connection and process (Zhang and Riordan, 2011). Therefore, these authors follow that algorithmic trading has an advantage to human action concerning the speed of how data is processed, prepared, and modified: In the USA, 52% of the total order volume is already due to high-frequency trading (Cheng, 2017).

#### **2.4 A banks' strategic vision on digitalization**

A banks' SVD denotes the idealized future state – including ideas, descriptions, and mental images – of the digitalized offerings of the organization and the extent to which this idealized future state is shared among organizational participants (also see James and Lahti, 2011; Yukl, 1994). The execution of strategic plans towards digitalization is an organization-wide phenomenon (Kraus *et al.*, 2019a) and requires the cooperation of employees working at different levels (Floyd and Lane, 2000). Resistance to change at lower levels in organizations can disrupt a strategic change initiative, not always through active opposition, but also in the form of apathy or inaction (Cândido and Santos, 2019). In addition, employees will be better able to execute a strategy when they understand the added value for the firm (Aaltonen and Ikävalko, 2002). This also applies to middle managers, who fulfill a pivotal role in strategy execution, as they combine access to top management with knowledge about the day-to-day activities (Wooldridge *et al.*, 2008). A clear vision on the role of digitalization, that is communicated and shared throughout the organization, can aid the process of aligning interests and improve strategy execution (Wilson, 1992). Webster (1992) finds that strategy should be in line with the organization's orientation or culture, which encompasses the fundamental values and beliefs that guide the organization. A vision of what the company stands for in terms of digitalization and how digitalization will aid goal attainment in the future provides guidance in the formulation of strategy itself, and sequentially, a justification for the strategic decisions made.

### 3 Hypotheses

An organizational-level focus on EO denotes a situation in which banks display higher levels of innovativeness, proactiveness, and risk-taking than their non-entrepreneurial counterparts (Covin and Slevin, 1991; Wales *et al.*, 2020). Through a focus on innovation and proactiveness, banks will more actively search for opportunities in the marketplace and will exploit those opportunities more quickly and with more innovative solutions than competitors (Lumpkin and Dess, 1996; Webb *et al.*, 2010). As such, banks that display high levels of EO will be better able to discover new market segments and attract new customers, and will provide innovative solutions and products to their existing clients as well (Covin and Lumpkin, 2011). In addition, a focus on innovation and proactive firm behavior makes banks more responsive to changing customers and technology requirements. EO denotes a forward-looking orientation and when the strategic apex of a bank embraces such an orientation, banks will be more open to new initiatives and technologies. Previous studies on EO in banks point toward network effects of EO (George *et al.*, 2001). Diverse networks allow top managers to be more aware and effectively scrutinize the different opportunities in the marketplace. Top managers of banks with a disposition towards EO are, therefore, more likely to spot new (digital) opportunities and better assess the risk associated with those (digital) opportunities. Risk can, however, never be eliminated and can result in more diverse outcomes in terms of profitability (Wiklund and Shepherd, 2011). Nonetheless, on balance, overall, the returns are expected to be positive. This leads to the first hypothesis.

*H1: There is a positive relationship between EO and firm performance within the banking sector.*

Digitalization can help banks cut costs and optimize their customer service/relations (Rai *et al.*, 2012; Setia *et al.*, 2013). Even though the implementation of IT solutions can be costly (Banker *et al.*, 2009) and new digital banking tools are not always embraced by customers (Holzinger *et al.*, 2007), developing a clear vision on digitalization would enable banks to overcome the downsides associated with it. A clear vision on digitalization would 'smoothen' the introduction, integration, and acceptance rate of new digital tools internally. When there is a clear vision on digitalization, employees are better able to understand the importance of switching towards digital services and online banking tools. As such, they will be more acceptant of digitalization, strategically reducing the amount of internal conflict (Floyd and Lane, 2000; Wernham, 1985), and better able to explain the use of such new tools to (new) clients. Aligning the internal organizational culture with the type of products and services that the financial services firm would like to offer is crucial for maximizing the marketing efforts of a firm and, ultimately, the performance of firms (Webster, 1992).

*H2: There is a positive relationship between a bank's SVD and firm performance.*

Banks can be characterized by different approaches to digitalization. Some banks might develop a coherent SVD (Warner and Wäger, 2019), while the online services they provide are not necessarily very innovative. In such cases, the strategic apex of a bank evaluates successful digitalization efforts by other banks and tries to replicate these efforts. Such banks will be reluctant to take action themselves or to volunteer for pilot programs initiated by corporate headquarters. Crucial to our understanding of sustainable competitive advantages is, however, that these acts of replication are unlikely to lead to sustainable competitive advantages (Porter, 1996). Instead, firms need to build unique resources (Barney, 1991) and need to constantly adapt their products and services ahead of the competition (Lumpkin and Dess, 1996).

When a market is characterized by uncertainty, as it is the case with rapid developments in information technology, contingency theory suggests that the fit between the external demands of the operating environment and the bank's strategic approach to digitalization is expected to be the main driver of firm performance (see Burns and Stalker, 1961; Lumpkin and Dess, 1996). Because the general direction in which the banking sector is developing (more digital tools and services) is known, but the exact format or dominant design of digital services and online tools is still unknown, the environment generates entrepreneurial spaces that can be addressed by those organizations that are willing to experiment with emerging technologies and out-of-the-box solutions (Boudreau *et al.*, 2011; Schumpeter, 1934). A more entrepreneurial approach to digitalization could, therefore, align the strategic approach of the bank with

the demands of the environment and result in unique resources (Kraus *et al.*, 2019a; Kraus *et al.*, 2019b) as being ahead of the competition when introducing new digital services (proactiveness) and allowing for reasonable costs incurred while experimenting with new digital solutions (risk-taking) is expected to lead to more innovative and unique digital offerings. As a result, banks that combine a SVD with EO can more easily differentiate themselves from banks that develop a non-entrepreneurial vision on digitalization and can attract new clients. This leads to our third hypothesis

*H3: Banks that combine SVD with EO will display higher levels of firm performance.*

EO not only enables banks to pursue their vision on digitalization more effectively, but banks that have made the switch to the digitalization of their services and online banking can also pursue different opportunities than banks that have not made this switch. Digitalization allows banks to communicate more quickly, frequently, and more effectively with their clients (Jayachandran *et al.*, 2004; Slater and Narver, 2000). Also, new business opportunities in the banking sector, for example dynamic currency conversion (see Gerritsen *et al.*, 2015), often require the use of IT applications. Consequently, banks that have a high digitalization rate will be better able to develop the required skills and to adapt their business models to allow for the pursuit of such opportunities. Over time, banks become acquainted with digital technologies and solutions if they frequently implement and experiment with new technologies. Therefore, banks with relatively high levels of digitalization will be able to pursue business opportunities that require digital solutions more quickly and effectively than banks that have little experience with them, leveraging the effect of their EO. In other words, banks with high levels of EO and digitalization can more effectively pursue business opportunities in environments that are characterized by rapid changes in information technology. This leads to our fourth hypothesis.

*H4: Banks that combine EO with a high level of digitalization will display higher levels of firm performance.*

In sum, we expect that, during times of rapid changes in information technology in the banking sector, the effect of EO on financial performance is moderated by a banks' SVD and the level of digitalization. We visualize these relationships in the conceptual model below (Figure 1).

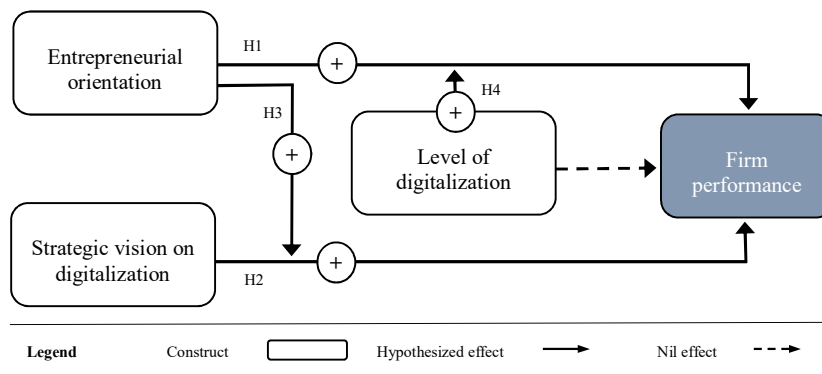


Figure 1. Conceptual model

## 4 Methodology

### 4.1 Sample

To draw valid conclusions about the banking sector and generate the most representative sample possible, a systematic sampling approach was applied. First, 1,500 e-mail addresses of banks were extracted from the German *Schober Information Group* database and checked for mistyping, actuality, and duplicates, eventually yielding 300 addresses. Second, as this database contains German banks only, we also used the information provided at [www.schweizer-banken.info](http://www.schweizer-banken.info) that contains lists of all banks in Switzerland and Liechtenstein to search for additional addresses. For both datasets, we subsequently used webpages of these banks to obtain e-mail addresses of top management executives. If no executive was identified, a general address with an e-mail directed at the top-managers was used. Overall, the sampling yielded 850 e-mail addresses.

After two pre-tests within the research team, as well as with two top-managers with banking background to improve the structure and understandability of the questionnaire, the final survey was implemented online via *Unipark*. The survey included a personalized salutation (if possible) and the affirmation of privacy and anonymity. A reminder e-mail sent one week after the initial e-mail and the promise to provide a summary of results for respondents was used to improve response rates. Subtracting 13 invalid e-mail addresses and 71 incomplete questionnaires, the final sample consisted of 102 complete responses. This number of respondents is comparable to other studies building on primary data collection with top-managers in the fields of entrepreneurship research (Klassen and Jacobs, 2001; Zahra, 1991). The final return rate of 12.0% is also well comparable to the average response rate of 10–12% in prior studies (e.g., Sieger *et al.*, 2013).

Among the 102 responding banks, approximately 80% of the key respondents were from upper (chief officers: 31.4%,  $n = 32$ ) or top management (executives: 48.0%,  $n = 49$ ) of different types of banks<sup>1</sup> (Raiffeisen: 44.1%; Canton: 24.5%; local: 12.8%) with a mean number of employees of 2,912 (standard deviation = 11,601). Five banks had over 10,000 employees, 13 banks over 1,000 employees, 44 banks over 100 employees, and 40 banks equal to or less than 100 employees.

<sup>1</sup> It should be noted that Raiffeisen banks are privately owned banks founded by a cooperative society, while Canton banks are state-specific federal banks in Swiss states (“Cantons”). Both types are representative for the German-speaking banking sector and do not imply any major difference in terms of operations or philosophy.



## 4.2 Measures

The questionnaire contained previously validated multi-item measures from entrepreneurial research as well as sector-specific variables and control variables (Table 1 for item labels). Firm performance was measured with four items by Chen *et al.*, 2007. The level of digitalization was assessed as a singular construct (Bergkvist and Rossiter, 2007) and developed for this study. EO measurement followed the approach by Eggers *et al.* (2013) and consisted of 14 items reflecting risk-taking (4 items), proactiveness (5 items), and innovativeness (5 items). The SVD scale reflected by 5 items by Müller *et al.* (2016) was used. Following Müller *et al.* (2016), the level of digitalization was measured by querying the concrete degree of digitalization in percent. All other variables were based on a five-point Likert-type scale (1: “does not fit at all”, 5: “fits perfectly”). For the following procedures, all measures are standardized to a mean of 0 and a standard deviation of 1.

To assess psychometric properties, i.e., reliability and validity, exploratory factor analyses (EFA) using minimum residual estimators, the coefficients Cronbach’s alpha and omega (Revelle and Zinbarg, 2009), as well as the newly introduced HTMT procedure (Henseler *et al.*, 2015), and confirmatory factor analysis (CFA) were applied. All calculations were done using *R* and appropriate packages (e.g., *car*, *psych*, *lavaan*). In a first step, EFA confirmed that all constructs but EO were unidimensional. As expected, EO yielded the three dimensions of risk-taking, proactiveness, and innovativeness with all related items loading highly on the respective dimension. Table 1 illustrates the loadings and item wordings for all constructs focused hereafter from CFA. It is noted that model fit for CFA ( $df = 238$ ,  $CFI = .89$ ,  $SRMR = .08$ ) is appropriate for the given sample size using corresponding flexible cutoffs with a p-value of .05 (Niemand and Mai, 2018).

Kommentiert [A1]: AU: Please expand “HTMT”?

Construct	Item wording	Loading*
Firm performance (Alpha = .82, M = 2.17, SD = 1.10)	Last year we achieved a higher sales growth than our (direct/ indirect) competitors.	.95
	Last year we achieved a higher profit growth than our (direct/ indirect) competitors.	.88
	Last year we achieved a higher growth on the number of employees than our (direct/indirect) competitors.	.52
	Last year we achieved a higher growth on market shares than our (direct/indirect) competitors.	.86
Level of digitalization (M = 43.94, SD = 21.26)	Please evaluate to what degree (percent) your business model is digitalized.	1.00
Risk-taking (EO, Alpha = .69, M = 3.26, SD = 1.07)	We value new strategies/plans even if we are not certain that they will always work.	.43
	To make effective changes to our offering, we are willing to accept at least a moderate level of risk of significant losses.	.58
	We encourage people in our company to take risks with new ideas.	.80
	We engage in risky investments (e.g., new employees, facilities, debt, stock options) to stimulate future growth.	.72
Proactiveness (EO, Alpha = .84, M = 2.24, SD = .97)	We continuously try to discover additional needs of our customers of which they are unaware.	.71
	We consistently look for new business opportunities.	.90
	Our marketing efforts try to lead customers, rather than respond to them.	.49
	We incorporate solutions to unarticulated customer needs in our products and services.	.61
Innovativeness (EO, Alpha = .87, M = 2.84, SD = 1.05)	We work to find new businesses or markets to target.	.77
	When it comes to problem-solving, we value creative new solutions more than solutions that rely on conventional wisdom.	.77
	We highly value new product lines.	.73
	We consider ourselves as an innovative company.	.83
	Our business is often the first to market with new products and services.	.66
Competitors in this market recognize us as leaders in innovation.	.94	

SVD (Alpha = .86, M = 2.09, SD = .83)	Our business has a clear vision of how to stay competitive in the next 5-10 years with respect to the digital strategy.	.53
	Our business has a clearly defined digital strategy.	.74
	Our digital strategy is implemented in all business units.	.55
	Our digital strategy is evaluated and adapted steadily.	.68
	We have established new business models on the basis of our digital technologies.	.55
Notes. Alpha: Cronbach's Coefficient Alpha, M = Composite mean, SD = Composite standard deviation *: Loading based on CFA with ML estimator		

Table 1. Measures

In step two, reliability was found to be satisfactory for all constructs (firm performance:  $\alpha = .82$ ; EO:  $\alpha = .88$ ; SVD:  $\alpha = .86$ ). Further, the dimensions of EO, risk-taking ( $\alpha = .69$ ), proactiveness ( $\alpha = .84$ ), and innovativeness ( $\alpha = .87$ ) indicate that risk-taking itself is not measured reliably. However, omega as a higher-order indicator for EO indicates adequate reliability (.88, M = 2.75, SD = 1.03). In the third step, average variances extracted (as of CFA) and HTMT values below .85 confirmed convergent and discriminant validity. We hereby used a reflective second-order operationalization of EO. Overall, no items had to be removed from our constructs. Tables 1 and 2 provide information about the measures and psychometric properties. Position, type of bank and number of employees (see sample description) were applied as organizational control variables since all of the focus constructs were at the organizational level. Since we focus on EO as an aggregate measure, we continue with the firm performance, level of digitalization, and SVD and use EO as a composite.

Construct	FP	LD	RT	PA	IN	EO	SVD
Firm performance (FP)	(.55)	-	.43	.49	.43	-	.57
Level of digitalization (LD)	-.24	(-)	-	-	-	-	-
Risk-taking (RT)	.41	-.08	(.37)	.53	.38	-	.17
Proactiveness (PA)	.40	-.32	.51	(.53)	.80	-	.54
Innovativeness (IN)	.40	-.27	.43	.82	(.55)	-	.51
EO	.45	-.32	.52	.96	.86	(.88)	-
SVD	.51	-.33	.09	.50	.48	.52	(.56)

Notes: Diagonal elements in brackets are average variances extracted (AVE) and Omega for EO from CFA. Above diagonal values (italic) are HTMT averages per construct (Henseler et al., 2015). "-" indicates empty values as LD is a single-item construct and EO is a higher-order reflective construct. Below diagonal values are construct correlations from CFA. AVE > .5 indicates convergent validity. HTMT < |.85| indicates discriminant validity.

Table 2. Convergent and discriminant validity of constructs

### 4.3 Non-response bias

We also assess the non-response bias, that is, our sample of responding banks differs substantially from non-responding banks. In order to investigate this bias, the approach by Armstrong and Overton, 1977 is taken, comparing differences between early (25th quantile), average (median) and late (75th quantile) responding banks in our items. Significant differences between those groups would indicate a causality of response and hence give a reason why non-responding banks have not responded. Applying t-tests between the early, average, and late groups of respondents yielded no average p-values lower than .05 (smallest p-value is for the first item of firm performance: .09). Consequentially, a non-response bias is unlikely.

### 4.4 Common method bias

An enduring issue with questionnaire designs is that the common method bias is possible. That is, correlations among constructs may be caused by their measurements within one source (Podsakoff et al., 2003). To check for this issue, the Harman one factor test was applied, that is, an EFA for all appropriate variables from the questionnaire is conducted. The solution for a single factor should then

show low variance extraction if a common method bias is absent (Spector, 2006). Following this procedure, this one-factor solution is highly insufficient (TLI = .56; RMSEA = .14; average variance explained = .31). Hence, a common method bias is unlikely.

## 5 Results

### 5.1 Model approach

*In order to assess our hypotheses as best as possible with the given sample, a robust bootstrapping approach with 5,000 resamples was applied on stepwise multivariate linear regression models (Efron and Tibshirani, 1994). It is noted that a (covariance-based) SEM with all variables and given the sample size is likely to violate minimum sample size conventions (Barrett, 2007). Constructs were based on standardized index scores while ordinal variables (position, type of bank) were used as contrasts. Beginning with a base model that only contains control variables (position, type of bank, number of employees, country of the bank), a subsequent model 1 integrated entrepreneurial orientation to test its predictive validity for firm performance (see Table 3). Hereafter, model 2 integrated the level of digitalization and a banks' SVD to address their incremental contribution. Finally, two-way interactions between EO and a) level of digitalization, as well as, b) the SVD (model 3) were introduced. To assess the incremental contribution of each model over the other, difference tests and cross-validated mean square errors (CV-MSE) were applied (Stone, 1974).*

### 5.2 Model results

Our stepwise regression approach confirmed that model 3 with interactions between EO and level of digitalization, as well as EO and a bank's SVD, explains the underlying data as best as possible, while the base model and models 1 and 2 illustrate the shift of effects from control variables to interactions (also see Table 3). In summary, this confirms our assumption that looking at EO alone is not sufficient to explain success ( $b = .30$ ,  $p < .01$ , Hypothesis 1 confirmed). The banks' SVD does not significantly predict firm performance ( $b = .15$ ,  $p > .05$ , Hypothesis 2 rejected). Instead, the interaction of EO with SVD should be considered ( $b = .24$ ,  $p < .05$ , Hypothesis 3 confirmed). Figure 2 illustrates the interaction effect. It depicts that the banks' SVD has a positive effect on firm performance only if EO is moderate to high with a significant Johnson–Neyman interval ranging from  $-.59$  on the EO scale to the maximum level of EO. Consistent with our theorization, the level of digitalization does not predict firm performance ( $b = .03$ ,  $p > .05$ ). However, the joint effect of EO and level of digitalization was not confirmed ( $b = -.08$ ,  $p > .05$ , Hypothesis 4 rejected). Further models with more interactions (three-way interactions) showed no considerable improvement in model prediction and yielded comparable results to model 3. Table 3 illustrates the results for the incrementally contributing models (base, models 1-3). Finally, the interplay of EO, level of digitalization, SVD, and only two control variables (private banks are more successful than other forms; German banks are slightly more successful than banks from Switzerland or Liechtenstein) explained up to 50% of firm performance in the banking sector.

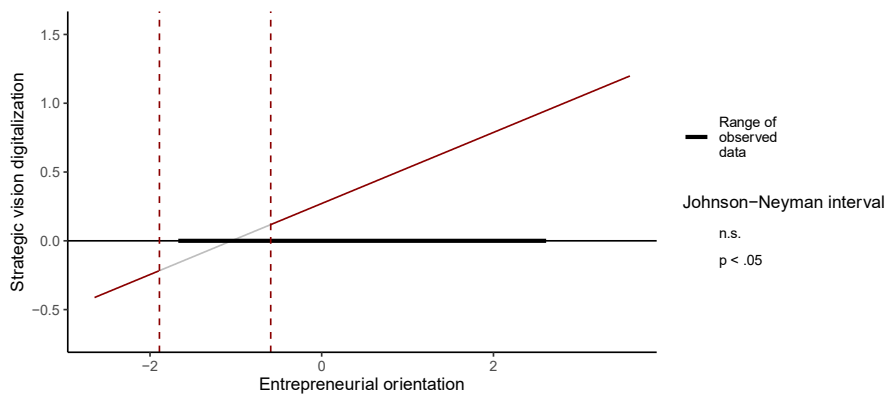


Figure 2: Interaction effect of EO and SVD on firm performance (Johnson–Neyman interval)

Model parameters	Base model			Model 1			Model 2			Model 3 (selected)		
	b	t	p	b	t	p	b	t	p	b	t	p
Intercept	-.61	-2.27	*	-.39	-1.35		-.42	-1.40		-.49	-1.69	*
Control variables												
Bank [Major]	-.94	-.13		-.96	-.16		-.70	-.14		-.79	-.15	
Bank [Private]	.64	1.40		.62	2.01	*	.38	1.18		.58	1.72	*
Bank [Raiffeisen]	-.15	-.59		-.34	-1.55		-.28	-1.27		-.16	-.70	
Bank [Local]	.31	1.26		.11	.44		.14	.57		.25	.91	
Bank [Other]	.30	.81		-.11	-.34		-.07	-.21		-.05	-.15	
Position [Executive Officer]	.66	2.99	**	.46	1.78	*	.49	1.91	*	.40	1.58	
Position [Leading executive]	.47	2.19	*	.41	1.71	*	.39	1.54		.32	1.26	
Position [Other]	.12	.48		-.32	-1.11		-.27	-.95		-.19	-.63	
Number of employees	.00	-.01		.00	.01		.00	.01		.00	-.02	
Country [Germany]	.45	2.28	*	.47	2.65	**	.45	2.56	**	.24	2.06	*
Effect variables												
EO				.45	5.04	***	.35	3.66	***	.30	2.86	**
Level of digitalization							-.01	-.12		.03	.33	
SVD							.20	1.92	*	.15	1.39	
EO x Level of digitalization							-.42	-1.40		-.08	-.81	
EO x SVD										.24	2.06	*
Fit statistics												
R-squared	.25			.43			.46			.50		
Model F (df1, df2)	3.09 (10, 91)**			6.13 (11, 90)***			5.72 (13, 88)***			5.76 (15, 86)***		
CV-MSE	.94			.75			.70			.68		

Notes: Dependent variable: Financial performance. All models bootstrapped with 5,000 resamples; [Value] indicates contrast to reference (Bank: Canton; Position: Executive employee, Country: Switzerland or Liechtenstein); Estimate is unstandardized; t: t-value of estimate; p: \*\*\* < .001, \*\* < .01, \* < .05; CV-MSE: Cross-validated mean square error with 34 folds (lower is better); Base model: Controls only, Model 1: Base model + EO, Model 2: Model 1 + level of digitalization + SVD, Model 3: Model 2 + interaction effects (x) of EO and level of digitalization, EO, and the banks' SVD.

Table 3: Model results

In order to assess the robustness of our results regarding bank size, we additionally used the number of employees as additional interaction terms with EO, level of digitalization, and the banks' SVD and proposed interactions (model 3). Equally, we constructed an interaction dummy for large and small banks (with 1,000 or more employees representing a "large bank"). Both specifications showed no

changes in the significance and direction of model 3 effects, indicating that the results are applicable to larger and smaller banks.

## 6 Discussion and Conclusions

Within the challenge to foster digitalization in the banking sector, previous research did not investigate the effect of a bank's SVD on the performance of banks. We closed this gap by taking an entrepreneurial approach to the topic and found novel findings that also answer our research questions: 1) banks that display high levels of EO report higher levels of performance. More importantly, 2) the relationship between a bank's SVD and performance is moderated by EO. That is, 3) neither strategy nor technology itself can improve a bank's success, but rather, the alignment of the strategic vision with the bank's inherent entrepreneurial ability can. These findings contribute new and long overdue insights into the role of entrepreneurship and digitalization within the banking sector and highlight that in times of technological change banks should develop a clear vision on digitalization that is characterized by innovation, being ahead of the competition, and a willingness to take risks.

Incumbent firms in each sector face unique challenges and opportunities within their operating environment. Firms in the financial service industry and banks, in particular, are currently faced with the transition to digital services and online tools (Warner and Wäger, 2019). Preliminary results suggested that banks do not benefit from offering digital services in terms of profitability because of the additional costs associated with the development and maintenance of IT applications. In addition, traditional service channels were described as more effective in terms of client acquisition, leading to enhanced profitability of those firms that focus on non-digital service solutions (Banker *et al.*, 2009). Our results confirm that the sheer level of digitalization of a bank does not affect profitability. Instead, banks should develop a clear vision on digitalization (Matt *et al.*, 2016) that is characterized by innovation (Kauffman *et al.*, 2015), being ahead of the competition, and a willingness to take risks. The fact that the novel digital services that are associated with EO improve firm performance points towards the importance of entrepreneurial action, even in sectors in which digital innovations are not welcomed by large groups of clients (Holzinger *et al.*, 2007). EO is thus crucial for banks that want to achieve competitive advantages and they need to combine SVD with EO, as SVD alone does not improve performance.

Interestingly, the interaction between the level of digitalization and EO was insignificant within our model. This suggests that there are no first-mover advantages in terms of experience with digital services and the use of EO. Even if banks make the transition to digital services and online banking after direct competitors, they can still be successful as long as the services they introduce are highly innovative and differentiate from those offered by competitors. The fact that previous experience with digitalization does not play a key role can be explained by the assumption that most banks, and especially the smaller ones, probably will not develop digital services and online banking tools in-house. Instead, they are likely to rely on external developers and IT consultants to develop IT applications on their behalf. Banks, therefore, do not develop digitalization resources that allow them to build sustainable competitive advantages but are able to achieve competitive advantages through a strategic focus on entrepreneurship (Kraus *et al.*, 2019a) that enables them to co-develop and introduce innovative applications more effectively. We argued that the network effects associated with EO in the banking sector exposes the top-management team of banks with the latest developments in the market and, as a result, they would be more open to experimenting with new technologies. EO, therefore, synthesizes the strategic orientation needed within a bank to explore and exploit new digital opportunities.

## 7 Limitations and Future Research

The results of our study should be interpreted in light of a couple of limitations. First, our results are based upon a sample of banks from German-speaking regions in Europe. Although we did not find any indications for specific sample selection bias and specifically selected this region because of the ongoing transition towards digitalization, the German-speaking banking sector is different from those in other European countries. The main difference is the large number of small banks that still operate

independently. In the UK or the Netherlands, for example, banks are substantially larger. Therefore, our results should be validated using samples from multiple countries. Research on the effects of bank size on digitalization efforts and opportunities is important as small banks may have different opportunities and may suffer from more budget constraints when it comes to developing new online banking tools. However, decision-making may be much quicker, and their current digital systems may be less complex allowing more innovative digital solutions to be developed. Second, we collected our performance data through a set of subjective performance measures together with the questions on EO, digitalization, and the banks' SVD. Even though this method is commonly used within EO research, we found no indications for a common method bias, and strong evidence for the convergent validity of perceived measures of performance is provided in different studies (e.g., Sarkar *et al.*, 2001; Dess and Robinson, 1984; Wall *et al.*, 2004). Future studies should confirm our findings by including objective indicators of firm performance to avoid these and other biases as well (e.g., overconfidence bias). Next to profits, objective performance indicators should also include elements of performance such as increases in turnover, sales, number of clients, number of staff, in order to account for the initial investments in digitalization that might negatively affect profitability. Finally, our measure of level of digitalization suffers from two limitations. First, it is measured through a single-item construct. Second, respondents may evaluate the degree to which a business model is digitalized in different ways. A more robust and in-depth investigation of the extent to which business models are digitalized may require the use of multiple item scales in order to capture the extent to which different elements of the business model are digitalized or departments (e.g., customer relations, accounting, R&D) make use of digital tools. Ideally, such follow-up studies also assess which type of digitalization tools is being used.

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