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Tokens, Coins & ICOs – Status and  
Need of a Holistic Evaluation

Dynamic Optimization of  
Cloudlet Infrastructures

Digitization Drives Knowledgeable  
Employees to Innovate

Digital Platforms Drive the Future  
of the Banking Business



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## Editorial

# Tokens, Coins & ICOs – Status and Need of a Holistic Evaluation

Udo Milkau

The first half of 2018 was an ambivalent time for “coin economy”. One could count 1,700 digital coins and aggregated market capitalization of approx. USD 300 billion. Since 2017, public awareness has shifted from coins to initial coin offering (ICO). Until July, ICOs collected USD 12 billion, versus USD 7 billion for 2017, with nearly half of that funding for EOS (USD 4.2 billion) and Telegram (USD 1.7 billion) according to the research firm Autonomous Research. In parallel, decentralized exchanges (DEX) – quasi Napster for coins – entered the market. On the other hand, more insight was achieved into the limitations of blockchains (i.e., the various distributed ledger technologies – all partial workarounds for the Fischer-Lynch-Paterson “Impossibility of distributed consensus” of 1985).

Agustín Carstens, BIS, summarized quite well: *“While perhaps intended as an alternative payment system with no government involvement, it has become a combination of a bubble, a Ponzi scheme and an environmental disaster.”* Technological restrictions became

obvious when the first successful “51% attacks” on two minor coins happened – before known as a “theoretical” problem of proof-of-work consensus mechanism. An attack with at least 51% of the network’s “hashpower” accomplished a double spend attack on Bitcoin Gold, and Monacoin in Japan suffered from a block withholding attack after one miner achieve 57% “hashpower”.

Eric Budish discussed the economics of such attacks and the principle tendency of proof-of-work consensus networks towards centralization with few dominating rent-seeking “minors” in *“The Economic Limits of Bitcoin and the Blockchain”*. Whilst the concept of Bitcoin assumed a P2P network without hierarchy and intermediaries, it evolved to an onion-like model with few rent-seeking providers (i.e., “miners”) and many service-consuming users.

Similarly, ICOs started as a way to fund start-up companies without the burden of traditional financing – sometimes with nothing more



Dr. Udo Milkau  
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Chairman of the Digitalization Working Group  
European Association of Co-operative Banks

than a whitepaper. Some ICO enthusiasts called for specialized regulation due to the novel nature of “ICO”. Nonetheless, a new label on an old bottle does not change content, and existing regulation covers the whole spectrum from money-like via loan-like to securities-like instruments.

William Hinman, US SEC, put it straight: *“The digital asset itself is simply code. But the way it is sold – as part of an investment; to non-users; by promoters to develop the enterprise – can be, and, in that context, most often is, a security – because it evidences an investment contract.”* Major supervisors, e.g., SEC, ESMA, BaFin, and FINMA, share a principle-based approach, issued warnings for consumers and guidelines for companies preparing an ICO, or started enforcements as a last measure.

Even if one focuses on technical use of “tokenized assets” in securities processing, “tokens” have to be compared with existing dematerialized securities. The current system

with a custody chain developed as an efficient compromise between shareholder register (centralized at issuer; push of payments) and bearer note (decentralized at investors, pull of payments). Any novel technology has to be more efficient, faster, or more cyber-resilient. Nevertheless, the discussions about blockchain technology act as a catalyst, disrupts mindcuffs, and facilitate new initiatives in the financial industry.

The current mélange of hype and hope emphasizes that profound discussions in the age of digitalization require two capabilities: a detailed understanding of financial market infrastructures, banking processes, and regulation on the one side, and insight from computer sciences, digital technologies, and – in the context of blockchain(s) – game theory and graph theory on the other side. Both will be key to turn innovative visions to tangible advantages. The E-Finance Lab is a great catalyst to put the puzzle together and to promote an exchange between practitioners, entrepreneurs, scientific research, and students.

## Research Report

# Dynamic Optimization of Cloudlet Infrastructures

THE GROWING DEMAND FOR DIFFERENTIATED QUALITY OF SERVICE REQUIREMENTS OF VARIOUS MOBILE APPLICATIONS ESTABLISHES THE NEED FOR ELASTIC CLOUDLET RESOURCE ALLOCATIONS. HERE, WE CONSIDER THE DYNAMIC OPTIMIZATION OF RESOURCE ALLOCATIONS IN REMOTE, AS WELL AS EDGE CLOUD INFRASTRUCTURES. WE CONSIDER TIME VARYING APPLICATION DEMANDS AND OPTIMIZE THE CLOUDLET RESOURCE ALLOCATION OVER A FINITE TIME HORIZON SHOWING THAT THE CORRESPONDING COMPUTATIONAL EFFORT IS REDUCED BY THREE ORDERS OF MAGNITUDE.

Ronny Hans

Amr Rizk

Ralf Steinmetz

### Introduction

In recent years, cloud computing has become a main paradigm for offloading data-intensive and computational tasks. This trend has been accompanied by the fact that the usage of mobile devices and applications has been ever increasing. Different mobile applications, such as video streaming, mobile gaming with real-time environment interactions, as well as simple communication, show different usage profiles. These different classes of mobile application also possess different requirements on the required service quality to make them run properly. Such span of quality of service guarantees cannot be simply provided by remote, centralized data centers. Cloudlets, i.e., small data centers at the network

edge, help reducing the latency between the mobile applications and the corresponding service. In general, it is known that it is possible to provide higher quality of service guarantees by increasing the number of data centers. However, this solution is suboptimal from a cloud infrastructure provider's point of view as it decreases the profit margin. Hence, cloudlets (Satyanarayanan et al., 2009) need to be wisely dimensioned and deployed to provide a wide range of quality of service guarantees and to elastically respond to changes in applications demands over time.

### Problem Statement

We consider a cloud infrastructure provider aiming to provide resources to application

service providers. The cloud infrastructure provider uses cloudlets to elastically capture the strict quality of service requirements of some applications while devolving other less strict applications to remote data centers.

We assume that cloudlets are geographically distributed with connections to the same Local Area Network (LAN) as the users. In this way, the applications observe a low delay and a high bandwidth to the services that run on cloudlet.

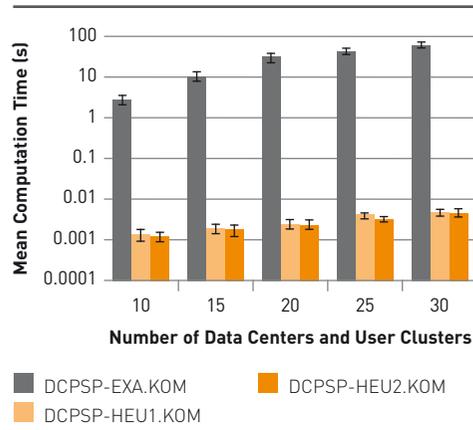
In our model, we sum up the user applications that are connected by a local WiFi into a user cluster with a predefined service demand which changes over time. The task of the provider is the efficient placement of resources at cloudlets to ensure covering the quality of service demand. Note that installing a new cloudlet causes fixed costs. Also note that cloudlets only possess a finite (small) capacity for services and that for each installed server we assume fixed costs arising. In addition, time varying costs arise with deployed resources, for example, for electricity and cooling. Further, if resources need to be migrated, costs arise. In general, service migrations can be time-aligned with data transfer. Therefore, we consider different migration costs depending on the service class (Hans et al., 2018). Costs arise as a penalty if a specific user demand cannot be fulfilled. Finally, we assume that the applications with the strictest quality of service levels have the highest assignment priority and also incur the highest migration and penalty costs.

From an application quality of service point of view, different quality of service guarantees can be provided by the different data centers and cloudlets to each user cluster. One metric of choice is the end-to-end delay that depends on the distance between the data center and the user cluster. Hence, we require a differentiation between cloudlets that are near to the user and remote data centers with abundant resources, however, higher delays to the user clusters.

### Optimization Approach

The aim of our optimization is to place cloudlet resources while providing quality of service guarantees. Hence, the optimization goal is to minimize the overall provisioning costs. We have formulated the dynamic cloudlet placement and selection problem (DCPSP) as a mixed integer linear program (Hans et al., 2018). The mathematical model provides an exact solution for the given problem (Hans et al., 2018). In order to solve the problem efficiently, we provide a heuristic solution approach.

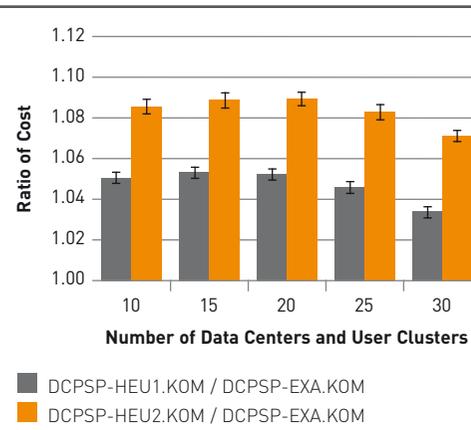
To quickly find solutions to the mixed integer linear problem (DCPSP) with an acceptable solution precision, we consider different heuristics. To establish a baseline, we, first, use a static approach that is known from related work (Hans et al., 2015). We provide improvements to this approach by extending the number of analyzed planning periods and by including further scenario details, such as link capacities and migration costs. Finally, we evaluate two different heuristics to mini-



**Figure 1: Impact of an Increasing Number of Cloudlets and User Clusters on the Mean Computation Time**

mize the total costs. The first heuristic aims to satisfy as much user application demands as possible while the second heuristic aims to limit the allocated resources to avoid over-provisioning. We denote the first strategy as DCPSP-HEU1.KOM. We assume that this heuristic causes high fixed costs but minimizes the penalty costs. The second heuristic, denoted as DCPSP-HEU2.KOM, aims to prevent peak-load based resource allocation which is known to waste resources under dynamic demand workloads. We note that such allocation might increase the overall fixed costs. Hence, the second heuristic can be seen as trading fixed costs for penalty costs.

If demands are unassigned, we iteratively assign demands until either the entire demands are satisfied or the resources are totally consumed [Hans et al., 2018]. Finally, we calcu-



**Figure 2: Impact of an Increasing Number of Cloudlets and User Clusters on the Solution Accuracy**

late the overall costs caused by the resource assignment, the penalties due to non-assignment of demands, and the possible migration.

### Evaluation

We evaluate the aforementioned cloudlet resource assignment heuristics using a Java and IBM CPLEX based implementation. For small problem sizes, we compare the heuristic solutions to the optimal solution, denoted as DCPSP-EXA.KOM. Note that remote data centers and cloudlets differ with respect to capacity, costs, and ability to satisfy quality of service guarantees, e.g., delays. We adopt the assumption that in relation to cloudlets we possess abundant resources at remote data centers.

In our simulations, we analyzed the influence of data centers and user clusters where we increased the number of data centers and user

clusters simultaneously while fixing all remaining variables. Here, we basically analyze the behavior of the entire cloud infrastructure for an equally increasing scale of demand and supply. Figure 1 illustrates the mean computation times with 0.95 confidence intervals for an increasing number of data centers and user clusters. The exact solution introduces high computational times that surpass the heuristics by multiple orders of magnitude. A solution for the test case with 10 data centers requires 2.8 seconds on average. For 30 data centers the solution time increases to 61.9 seconds. In contrast, our heuristics reduce the computation time by at least three orders of magnitude. Further, the evaluation in Figure 2 shows that limiting resources yields worse results. Here, we provide the ratio of the costs obtained by each heuristics in comparison to the costs obtained by the exact approach. It is clear that the first heuristic outperforms the second one. Unexpectedly, the solution quality increases with an increasing number of data centers. We note that a possible reason for this effect can be found in a higher number of available resources. Although the application demands increase, a higher number of resources is available and is better able to handle demand fluctuations.

### Conclusion

Cloud infrastructures face highly elastic quality of service demands that are driven by a wide spread of mobile user applications. Hence, infrastructure providers need to optimize available cloud resources to be able to respond to such demand fluctuations. A promising approach is based on the idea of cloudlets,

which are local miniature cloud installations with limited capacity. For such an approach to be efficient and profitable, the cloud infrastructure provider needs to optimize the use of the cloudlet installations especially given heterogeneous and time-varying demands by the user applications. In this work, we mapped this problem to a mixed integer linear optimization problem, for which we provided multiple heuristics to overcome the high computational effort associated with the exact solution. Evaluations show that our approaches significantly reduce the computation time by multiple orders of magnitude while still providing a high solution precision.

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## Research Report

# Digitization Drives Knowledgeable Employees to Innovate

DIGITIZATION CHALLENGES COMPANIES TO ACCELERATE THEIR INNOVATION CYCLES TO STAY COMPETITIVE. THIS RESEARCH INVESTIGATES HOW IT KNOWLEDGE ESTABLISHED ON DIFFERENT HIERARCHICAL LEVELS LEADS TO ORGANIZATIONAL INNOVATIVENESS. DIFFERENTIATING BETWEEN STRATEGICALLY MORE AND LESS DIGITIZED ORGANIZATIONS, THE RESULTS REVEAL: ORGANIZATIONAL INNOVATIVENESS IS SIGNIFICANTLY HIGHER INFLUENCED BY THE IT KNOWLEDGE OF BUSINESS EMPLOYEES IN ORGANIZATIONS GIVING THE DIGITAL BUSINESS STRATEGY HIGH IMPORTANCE, WHEREAS THE MANAGEMENT'S ROLE DECREASES. WE FURTHER DEDUCE THE CIO'S POSITIVE ROLE FOR IT-ENABLED BUSINESS INNOVATION IN KNOWLEDGE-INTENSIVE INDUSTRIES, SUCH AS THE FINANCIAL SERVICES SECTOR.

### Nico Wunderlich

#### Introduction

For more than nearly four decades, the question whether or not technology is able to generate new products is discussed. Fueled by digitization, highly digitized markets demand organizations to become more and more innovative. The commonly used digital infrastructure is not enough to stay competitive since it can be swiftly copied or imitated. Organizations face up with these digitization challenges by developing and executing a digital business strategy (DBS) that merges business and information technology (IT) strategies into a single one (Bharadwaj et al., 2013). A DBS allows organizations to generate more business value

### Roman Beck

from IT and thereby profit in highly competitive markets. In order to implement a DBS successfully within a company, a continuous and organization-wide culture towards innovativeness needs to be established.

Organizational innovativeness expresses the capability of an organization to generate new ideas from the interplay between technical and administrative innovations. As especially IT contributes to understand, synthesize, and apply technical knowledge for developing innovations, this research concentrates on the role of the CIO as agenda setter, influencer, and distributor of IT knowledge within organizations.

Innovative organizations are characterized by leadership in particular balancing influences from "outside" with capabilities and knowledge from "inside" the organization to assess potential innovation opportunities. Herein, the CIO's role is mission-critical as he or she is in charge of turning IT capabilities into IT-enabled business innovation.

This research aims at exploratively investigating how different degrees of executed DBS lead to different organizational innovativeness outcomes. This will reveal first insights on organizational consequences of DBS. Further, we explain the role of the CIO in how the distribution of IT knowledge especially to the business side contributes to organizational innovativeness, which ultimately leads to organizational performance.

#### Leadership, Knowledge, and Innovation

Leaders act as both (informational) sources of knowledge and (interpersonal) energizers for creating knowledge. Especially in knowledge-intensive industries, hierarchical exposed senior managers effectively lead in creating organizational knowledge by stimulating organizational learning. For innovative organizations, the leadership function has to provide

broad guidelines to the organization, balancing the knowledge transfer from "outside" to "inside" the organization and leaving enough room for the employees to act innovatively at the same time. In order to measure IT leadership by means of a state-of-the-art construct, we adapted items from a recent study revisiting managerial roles for IT leadership against the background of digitization (Wunderlich and Beck, 2017; Table 1). Especially in service and knowledge-intensive industries, such as the financial industry, IT knowledge is a pivotal organizational resource and becomes increasingly evident for the business side due to forced business process digitization.

Knowledge, IT, and innovativeness are closely intertwined: IT represents a crucial component for organizational knowledge storage and sharing, whereas knowledge plays a crucial part in innovation processes. Innovation requires to integrate heterogeneous knowledge resources from both external as well as internal sources to generate creative ideas, tasks, or procedures. IT offers a basis to acquire, collect, and internalize data and information, thereby enhancing the analytical capability of an organization and contributing to build organizational knowledge (Joshi et al., 2010).

Providing new business-side employees with adequate training for the introduction to the IT-related job tasks at hand.
Evaluating the quality of business-side employees' IT performance.
Gathering information about IT trends outside your organization.
Allocating IT equipment or related materials.
Learning about new ideas originating outside of your department.

Table 1: CIO IT Leadership, 5-Item-Conceptualization (Wunderlich and Beck 2017)

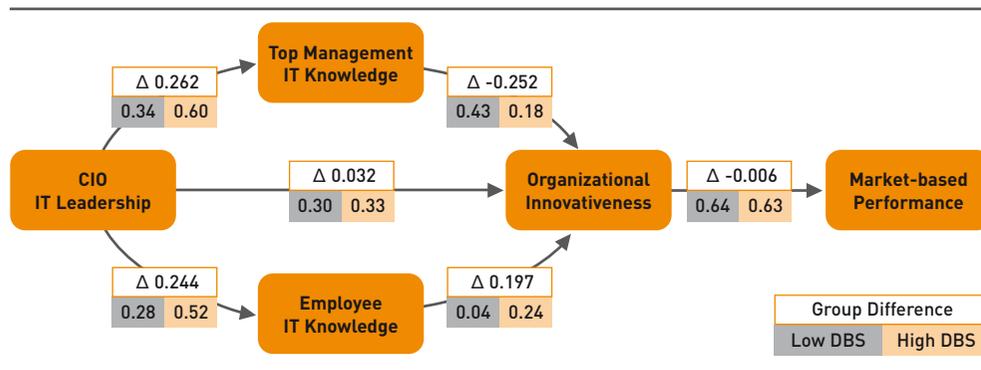


Figure 1: Resulting Group Differences (Wunderlich and Beck, 2018)

Especially for complex and technical undertakings, digital platforms serve to understand, synthesize, and apply knowledge in innovations developing (Yoo et al., 2012).

Not surprisingly, organizational innovativeness is closely related with organizational culture that stimulates learning, development, and participative decisions. In particular, organizational innovativeness significantly influences firm performance in turbulent markets, where a technology-centered strategy catalyzes the effect of organizational innovativeness on firm performance. In highly digitized markets, organizational innovativeness serves as a longer lasting capability since it appears difficult to imitate.

**Empirical Investigation**

This research concentrates on how internal, IT-related competencies and resources (IT leadership, IT knowledge) lead to more business value (organizational innovativeness, market-based performance). According to the

definition of a DBS as guideline how to configure the internal resources in order to impact on the market, this exploratory research focuses in particular on how the regarded influences vary in accordance with the degree of established DBS. By validating the proposed hypotheses (each represented by one arrow in Figure 1), we gain first quantitative results about realized DBS in organizations.

In order to test the proposed hypotheses, a study sample of 228 senior IT decision makers in the US was collected within a questionnaire-based online survey between December 2016 and January 2017. 1,015 participants of a CIO panel operated by a large international market research institute were invited to answer the survey. In particular, we focused on knowledge-intensive organizations as classified by the OECD to concentrate on firms that are most likely to have a DBS. In addition, to control for industry sector, we ensured for firm sizes larger than 50 employees and IT departments with more than two employees. To test

the proposed hypotheses, we computed the research model within a structural equation modeling (SEM) achieving very high quality criteria for all measurement constructs.

To differentiate the degree of executed DBS within the knowledge-intensive organizations, we asked the respondents to indicate how much the following statement applies to their organization (rated on a 5-point Likert scale): “Our organizational strategy is formulated and executed by leveraging digital resources to create differential value”, adopted from the given DBS definition (Bharadwaj et al., 2013, p. 472). A descriptive analysis of the variable led to a group division resulting in low-DBS (n=98, for Likert values 1-3) as well as high-DBS organizations (n=130, for Likert values 4 and 5). The comparison of the two groups shows several significant deviations (Table 2): mainly, high-DBS firms are larger than low-DBS firms. Likewise, market share and IT department size correlate with firm size and show higher values for high-DBS organizations. The calculated relation of firm size towards IT department size results in a significantly higher IT support intensity in high-DBS firms, in particular, 8.5 employees ministered by one IT employee in high-DBS firms versus 10.2 in low-DBS firms. IT experience and organizational tenure of a CIO is at same level for both groups, slightly higher in high-DBS firms (about one year).

**Research Results**

Interested in group differences between high-DBS and low-DBS firms, we state a higher influence of employee IT knowledge on organi-

zational innovativeness in high-DBS firms. In parallel, the top management’s IT knowledge on organizational innovativeness remains on lower level in high-DBS firms. This interaction effect is demonstrated in Figure 1, presenting the path intensity for both high-DBS and low-DBS groups and the respective difference  $\Delta$ . Notably, the first effect is exclusively found for high-DBS firms, while almost all hypothesized influence from employee IT knowledge on organizational innovativeness was rejected for low-DBS firms (0.049).

Representing the CIO-initiated process to achieve IT knowledge distributed on two hierarchical levels of the business side (top management and employees), we find significantly higher influence of a CIO’s leadership activities on IT knowledge in high-DBS firms on both top management and employee IT knowledge. This confirms prior findings on how the CIO influences IT knowledge throughout the whole organization; and underlines the exceptional role of IT knowledge on all hierarchical levels in knowledge-intensive industries. Further, we state the CIO’s leadership function as playing a crucial role especially in high-DBS organizations.

The direct influence of the CIO on organizational innovativeness stays nearly equal in both groups, but on lower level than the IT leader’s influence on IT knowledge in high-DBS firms. Finally, the influence of organizational innovativeness on market-based performance was found similar for the whole sample as well, underlining the general importance of this

organizational ability on firm performance in knowledge-intensive businesses.

### Discussion of the Results

This research found convincing empirical evidence how knowledge-intensive organizations transfer external influences by means of an IT-integrated business strategy, namely DBS, to effective internal organizational structures and resources and finally firm performance. Especially organizations conducting a DBS (Bharadwaj et al., 2013) take advantage of the pivotal resource of IT knowledge on the managerial and the business employee level. We primarily want to highlight that the positive consequences of firm IT knowledge exclusively occur in organizations executing DBS to achieve organizational innovativeness. This is particularly essential for competitive reasons, organizational innovativeness as part of organizational culture is even harder to imitate (Joshi et al., 2010).

Based on a sample of industries grouped upon the degree of knowledge intensity provided by the OECD, we are able to confirm recent considerations on organizations becoming increasingly dependent on IT-based innovations. This supposes that the type of strategy

an organization conducts significantly impacts how organizational knowledge is utilized for organizational innovativeness, resulting in increased firm performance in the same step. Generally, we can underline the costly and – at first glance – inefficient processes of sharing and creating organizational knowledge as relevant for organizations to cope with the challenges arising in highly digitized markets by means of organizational innovativeness.

For the entire sample, we can state a hierarchically similar influence of the CIO on IT knowledge of the top management or of business employees. Differentiating between the two DBS groups, we find a significantly higher influence of CIO leadership on both types of IT knowledge, underlining empirical results that both IT knowledge and CIO leadership play a more present role in DBS organizations.

We can state that high-DBS organizations more intensively take advantage of the improvements offered by utilizing IT and IT capabilities for innovation processes (Yoo et al., 2012). Furthermore, we can concretize prior findings on how the hierarchical level distinguishes in being affected by knowledge processes.

In more detail, we found strong evidence for two general relationships on the basis of the complete sample. First, the influence of organizational innovativeness on market performance reacts similar in both subsamples, confirming prior research results. This emphasizes the relevance of business strategies to transfer innovations effectively to the market in general. Second, the influence of the CIO on organizational innovativeness performs nearly equally for both groups, underlining the pivotal influence of the CIO's potential for IT-enabled business innovation.

For IT leaders in practice, our findings reassure and intensify the CIO to utilize IT for business innovation. We applied a modernized and comprehensive CIO IT leadership construct (Wunderlich and Beck, 2017), verifying the CIO's function as crucial institution in executing a (digital) business strategy. The findings underline the CIO's leadership role as mediator between the external environment and internal structures and resources since the used items express the process of gathering information from outside of the organization as well as from the business-side for acquiring new organizational knowledge. Our findings further confirm the influence of organizational leaders on knowledge creation and dissemination. Organizations executing DBS generate organizational innovativeness by integrating more employee IT knowledge than top management IT knowledge, compared to low-DBS organizations. In practice, CIOs in highly digitized business environments shall concentrate on rein-

forcing this beneficial employee level based organizational resource.

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Means of Groups	Firm Size	Market Share	Size IT Unit	Firm Size / IT Unit
Low-DBS	3,166	35	149	10.2
High-DBS	47,698	46	8,684	8.5
Full Sample	28,557	41	5,016	9.2

Table 2: Differences in Group Characteristics

## Insideview

# Digital Platforms Drive the Future of the Banking Business

INTERVIEW WITH MARTIN WALDMANN

**Digital platforms and ecosystems are increasingly becoming determining factors in banks' business models. Internet giants, such as Google, Apple, or Amazon, and Chinese companies, such as Tencent and Alibaba, are penetrating new market segments – including financial services. How are the savings banks dealing with these new competitors and the changed customer behavior?**

Customer expectations in terms of availability, convenience, scope, and depth of service are increasing. The benchmark for a digital financial platform is no longer just other banks, but what the BigTechs are offering their customers. The German Savings Banks Finance Group is in a good starting position and has already attracted millions of customers to its digital offerings: online banking, mobile banking, electronic mailboxes, and even P2P payments via Kwitt. With the launch of multibanking this summer, we are further expanding our offerings in the direction of personal finance management.

**You mentioned digital financial platforms – what does this look like for the German savings banks?**

Our aim is to make the services and offerings of the entire Savings Banks Finance Group available to customers via the Internet Filiale and the Sparkasse-App – in addition to the onsite advisory and service offerings that will continue to be important in the branches. The customers should be able to organize all of their savings bank, insurance, building society, or investment products and receive personal financial management. This approach places the customer at the center today.

**Will such a platform only provide classic financial products?**

It forms the core around which further value-added services – in particular complementary, financial-related services – will be grouped. These can be solutions that are based on the customer's data, be it to optimize his financial



**Martin Waldmann**  
Chief Representative and  
Head of Staff Division  
Finanz Informatik

planning or to help him with his tax return. But they can also be services for managing contracts. To do this, the customer can use our solution in conjunction with the FinTech Aboalarm. Another example is the "SAM" application, which we are testing and which even takes digital inheritance into account. Ultimately, the savings banks want to use their platform to regularly offer customers new, innovative services that can also be developed in cooperation with FinTechs, for example, at the Sparkassen Innovation Hub in Hamburg.

**How will such a platform position itself against the competition?**

Of course, the aim is to bind existing and new customers to the Sparkasse as their main banking relationship – with the current account as an anchor product. In the future, however, this will also mean enabling them to manage third-party solutions via this platform – as is already the case today with multibanking support for other banks. The reality is that,

owing to greater market transparency on the Internet, customers are also using third parties for individual services. We want to enable these customers to manage these financial products from a central platform – ours. This is the only way to ensure that holistic personal finance management is a viable option.

**And what about established comparison or brokerage platforms on the market?**

We can use APIs to enable the savings banks to integrate their services into such platforms. In the future, for example, a savings bank customer could authenticate himself on used car or real estate platforms via YES and then directly access a financing calculator from his savings bank that offers him individual financing conditions. After all is said and done, one thing is clear: Digital life will soon take place on platforms, those which you offer yourself and into which you integrate your services.

**Thank you for this interesting conversation.**

# Infopool

## News

### Meet the Best Students!

On November 5<sup>th</sup>, 2018, the E-Finance Lab hosts together with its industry partners a “get-in-touch” event for the best students from Frankfurt and Darmstadt. For this event, the best Bachelor and Master students from specific lectures in the areas computer science, finance, information systems, and marketing are invited. These students have the chance to personally meet representatives from our industry partners and from the E-Finance Lab.

### Prof. Steinmetz is Member of the Council for Ethics in Digitization

The Hessian government established a council for ethics in digitization. It was constituted on September 19<sup>th</sup> under the chair of Volker Bouffier. Prof. Steinmetz (layer 1) is a member of this council, which is responsible for observing and judging the impact of new technologies and applications on the human being. The council is part of the digital strategy of the Hessian government. It especially cares for the concerns of the citizens; digitization is for the people not vice versa.

### Marketing Strategy Meets Wall Street Conference

Prof. Skiera will co-organize (with Prof. Abhishek, INSEAD Business School) the 6<sup>th</sup> “Marketing Strategy meets Wall Street Conference”, June 16<sup>th</sup>–18<sup>th</sup>, 2019, at INSEAD, Fontainebleau. This very successful international conference aims to bring together researchers from finance, accounting, marketing, and information systems to study how marketing and IS decisions impact the stock market. The upcoming conference will also have sessions on the application of big data and AI in the marketing-finance interface (machine learning, finance, and marketing) and FinTech. The conference starts on June 16<sup>th</sup>, 2019, with an evening reception and ends on June 18<sup>th</sup>, 2019, around 3.30 pm. More information is available here: <https://www.insead.edu/faculty-research/academic-areas/marketing/marketing-strategy-meets-wall-street-conference>.

### Daniel Blaseg Receives Best Paper Award

Daniel Blaseg, doctoral candidate at the Chair of Electronic Commerce (Prof. Skiera, layer 3), has received the Best Doctoral Paper Award at the 3<sup>rd</sup> Entrepreneurial Finance Conference in Milan for his paper “The Fallacy Problem of Entrepreneurs.” Congratulations!

### Dr. Iman Ahmadi Appointed Assistant Professor at Warwick Business School

After having succeeded in defending his dissertation in July 2018, Iman Ahmadi (supervisor Prof. Skiera, layer 3) takes a faculty position as assistant professor for marketing at the Warwick Business School, UK. We wish him all the best for his future career!

### New Colleague at the Chair of Prof. Gomber

In July 2018, Timo Schäfer joined the Chair of Prof. Gomber (layer 2) as doctoral student. He holds a Master in Banking & Finance and Data Science from the University of Zurich. In his master’s thesis, he theoretically and empirically worked on the complexity of financial regulation. Welcome!

## E-FINANCE LAB SPRING CONFERENCE 2019

The E-Finance Lab cordially invites to its annual Spring Conference. The event will be held on February 26<sup>th</sup>, 2019, and is organized by Prof. Hackethal and his team (layer 3). Participants have the chance to discuss the topic “Artificial Intelligence in the Financial Service Industry – Concepts, Applications and Implications for the Rhine-Main Area” with speakers from science and practice.

In a few weeks, you will find further information on our website: [www.efinancelab.de](http://www.efinancelab.de)  
Here, you will also be able to register for the event. As always, the participation is free of charge.

## Selected E-Finance Lab Publications

### Bannier, C.; Pauls, T.; Walter, A.:

Content Analysis of Business Communication: Introducing a German Dictionary.  
Forthcoming in: Journal of Business Economics.

### Gomber, P.; Clapham, B.; Lausen, J.; Panz, S.:

The Impact of MiFID II/MiFIR on European Market Structure: A Survey among Market Experts.  
In: The Journal of Trading, 13 (2018) 2, pp. 35–46.

### Gomber, P.; Clapham, B.; Lausen, J.; Panz, S.:

The MiFIR Trading Obligation: Impact on Trading Volume and Liquidity.  
In: 35<sup>th</sup> Annual Conference of the French Finance Association (AFFI); Paris, France, 2018.

### Richerzhagen, N.; Kluge, R.; Richerzhagen, B.; Lieser, P.; Koldehofe, B.; Stavrakakis, I.; Steinmetz, R.:

Better Together: Collaborative Monitoring for Location-based Services.

In: Proceedings of the 19<sup>th</sup> International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM); Chania, Greece, 2018.

### Siering, M.; Muntermann, J.; Rajagopalan, B.:

Explaining and Predicting Online Review Helpfulness: The Role of Content and Reviewer-Related Signals.  
In: Decision Support Systems, 108 (2018), pp. 1–12.

For a comprehensive list of all E-Finance Lab publications see <http://www.efinancelab.com/publications>

## Infopool

### RESEARCH PAPER: CATERING TO INVESTORS THROUGH SECURITY DESIGN: HEADLINE RATE AND COMPLEXITY

This paper investigates the relationship of headline rates, complexity, and risk of retail structured products. The findings support the hypothesis that banks strategically design complex products to cater for yield-seeking investors. A retail structured product is more complex, the more dimensions its payoff description has. That makes it harder for retail investors to understand it and to compare it to other products. The headline rate refers to the best-case scenario return and risk indicates whether the product exposes retail investors to a complete loss or not. The authors find that products exhibiting higher headline rates are more complex and more often expose retail investors to a complete loss of their investment. Moreover, they provide evidence that both headline rates and product complexity increase in a low interest rate environment. Finally, more complex products with higher headline rates generate higher profits for banks. The overall findings have important implications concerning the regulation of complex financial retail products and the adequate protection of retail investors.

Célérier, C.; Vallée, B.

In: *Quarterly Journal of Economics*, 132 (2017) 3, pp. 1469–1508.

### RESEARCH PAPER: AN EMPIRICAL STUDY ON MODELING AND PREDICTION OF BITCOIN PRICES WITH BAYESIAN NEURAL NETWORKS BASED ON BLOCKCHAIN INFORMATION

Bitcoin is a successful cryptocurrency introduced into the financial market based on blockchain technology. It has attracted attention in the fields of economics, cryptography, and computer science. In this paper, the focus is on the Bitcoin pricing process. The authors use a combination of Bayesian neural networks (BNNs) to analyze the time series of the Bitcoin process and the most relevant features from blockchain information which is deeply involved in Bitcoin's supply and demand. The blockchain information is used to train models for improving the predictive performance of the latest Bitcoin pricing process. In this empirical study, the Bayesian neural network is compared to other linear and non-linear benchmark models on modeling and predicting the Bitcoin process. Based on the empirical investigations, it is shown that the BNN performs well in predicting Bitcoin price time series and explaining the high volatility of the recent Bitcoin price.

Jang, H.; Lee, J.

In: *IEEE Access Journal*, 6 (2018), pp. 5427–5437.

## E-Finance Lab Quarterly

The E-Finance Lab publishes the Quarterly in the form of a periodic newsletter which appears four times a year. Besides a number of printed copies, the EFL Quarterly is distributed digitally via E-mail for reasons of saving natural resources. The main purpose of the newsletter is to provide latest E-Finance Lab research results to our audience. Therefore, the main part is the description of two research results on a managerial level – complemented by an editorial, an interview, and some short news.

For receiving our EFL Quarterly regularly via E-Mail, please subscribe on our homepage [www.efinancelab.de](http://www.efinancelab.de) (→ news → sign up / off newsletter) as we need your E-mail address for sending the EFL Quarterly to you. Alternatively, you can mail your business card with the note "EFL Quarterly" to the subsequent postal address or send us an E-mail.

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[www.efinancelab.com](http://www.efinancelab.com).**



The E-Finance Lab is a proud member of the House of Finance of Goethe University, Frankfurt.  
For more information about the House of Finance, please visit [www.hof.uni-frankfurt.de](http://www.hof.uni-frankfurt.de).

THE E-FINANCE LAB IS AN INDUSTRY-ACADEMIC RESEARCH PARTNERSHIP BETWEEN FRANKFURT AND DARMSTADT UNIVERSITIES AND PARTNERS DEUTSCHE BÖRSE GROUP, DZ BANK GROUP, FINANZ INFORMATIK, 360T, FACTSET DIGITAL SOLUTIONS, AND USD LOCATED AT THE HOUSE OF FINANCE, GOETHE UNIVERSITY, FRANKFURT.

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