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Systemic Stability and Algorithm-Based Policy Interventions

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Declaration:

Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology, has not been previously submitted for doctoral or equivalent academic degree.

Dirk-Hinnerk Fischer

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DIRK-HINNERK FISCHER

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List of Publications

- I **Fischer, Dirk-Hinnerk**. 2018. "The European Rating Fund." *Journal of Financial Regulation and Compliance* 26 (2) (1.1)
- II **Fischer, Dirk-Hinnerk**. 2017. "How Tracking of Electronic Money Might Improve Financial Market Crisis Intervention." *Management* 12 (4): 299–314 (1.2)
- III **Fischer, Dirk-Hinnerk**, and Krimmer, Robert. 2018. "Towards a Networked Modern Democracy – Thoughts on How ICT Could Enable New Forms for the Relationship Between Citizens and their Representatives." *dg.o 2018: Proceedings of the 19th Annual International Conference on Digital Government Research* (3.1)

Appendix

- IV Krimmer, Robert, and **Fischer, Dirk-Hinnerk**. 2016. "Gedanken zu einem negativen Wahlsystem und der mögliche positive Einfluss." *Jusletter IT* 25 May (1.2)
- V **Fischer, Dirk-Hinnerk**. 2016. "Making a Mark – Time-Changing Politics from Estonia." *Baltic Journal of European Studies* 6 (1) (20) (1.1)
- VI Krimmer, Robert, **Fischer, Dirk-Hinnerk**, and Schmidt, Carsten. 2017. "Bürgerkonten und das Projekt "The Once-Only Principle"". *Public Governance* 4 (1.2)
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Author's Contribution to the Publications

- III The author of this thesis is corresponding and lead author. The responsibilities included the determination of the research design and the publication strategy. The concept discussed in the paper was also developed to a large extent by the author of this thesis. The second author significantly contributed to the overall scientific quality of the paper.
- IV The author of this thesis led the research design and the development of the paper. The corresponding author was responsible for the publication process of the paper.
- VI The research of the international conditions in all countries, except for the German case, were done by the author of this thesis. He also combined the different parts of the paper. The authors developed the research design and process for the paper together.
- VII The conceptualisation as well as a large share of the research was undertaken by the author of this thesis.

Introduction

Algorithm-based, self-learning and automated information and communication Technology (ICT)-based systems have a potential to fundamentally change society (Lee and Whitley 2002; Perez 2009).¹ Algorithm-based systems are increasingly powerful agents in society. Therefore, it becomes essential to investigate the potential that these systems hold for policies, regulations and public intervention in general. The objective of this dissertation is to determine if and how algorithm-based public interventions might be able to counter systemic instability. The thesis is hence particularly interested in the relationship between algorithm-based systems and overall systemic stability.

Algorithms are by far not the only important factors of change. Algorithms can create stability, but also instability. The different destabilising effects in society need to be well-understood in order to be able to create efficient and effective algorithm-based public intervention, especially if this intervention is aimed to stabilise systems. Algorithms might be one possible trigger of systemic instability, but instability comes in many forms and from many sources. Instability can result from the accumulation of risk within a system, it can also result from uncertainty within and about a system (Dopfner 2005; Knell 2014).² Many of the different facets of instability became visible in the 2008 financial crisis and the subsequent Euro and European crisis (Ait-Sahalia et al. 2009; Hermann 2017) The sub-prime crisis and its subsequent events confirmed Hyman Minsky's theory on instability (Benes and Kumhof 2012; Kregel 2012). He used the market fragility of the economy to describe the cyclicity of markets, particularly the financial market. The financial instability hypothesis by Minsky describes the tendency of the financial markets towards destabilising themselves. Phases of relative stability can lead to instability. In this theory, innovation is a key driver of destabilisation. However, it also depends on the current regulations and the loopholes in the regulation. The theory states that the higher the percentage of high risk, or even Ponzi products the market has, the higher the potential instability. These developments derive from the struggle of the individual company to obtain a better position in the market for themselves, meaning that the financial structure changes over time and develops from the initial composition on which the regulation was targeted. In Minsky's theory, the market structure becomes more and more unregulated and, over time, more and more unstable (Minsky 1986). For Minsky, the analysis of speculative crises was not as important as the analysis of sustainable periods in which financial fragility develops. He put it like this: "... prolonged prosperity transits from financial relations that make for a stable system to financial relations that make for an unstable system" (Minsky 1992, page 8). Times of "prolonged prosperity" trigger a continuous development with destabilising effects, as the source of instability is the usage of opportunities for

¹ ICT-based systems include algorithm-based systems, systems of artificial intelligence (AI) and automated systems. Algorithm-based systems are ICT-based systems that are either able to learn independently or able to automate processes. AI systems are self-developing and self-learning computer systems. They are a particular form of algorithmic systems. Automated systems, on the other hand, are systems that can run independently from humans. Automated systems are also a subcategory of algorithm-based systems (Andrews et al. 2017; Hildebrandt 2018).

² Systemic instability is seen here as the correlated failure of individual components of a system precipitating a collapse of the system in its entirety (Alessandri et al. 2009; Minsky 1986; Schinasi 2004).

profit-making in the markets. Or, as Minsky succinctly put it: “Innovations result from profit opportunities” (Minsky 1986, page 359). Minsky aimed to contain instability in order to create long-lasting stability (Minsky 1992). Currently, the continuously developing automation of increasingly complex processes challenges countless markets. Automation also challenges an always increasing percentage of human labour worldwide (Article **VII**). The research gap this dissertation discerns is the implementation and application of algorithm-based public intervention systems to stabilise systemic instability. The essential research question therefore is:

Under which conditions can algorithm-based public intervention systems be employed to counter systemic instability?

The following section summarises “the state of the art” of algorithm-based policy interventions. Section 1.0 discusses briefly the common application of algorithms in public intervention systems. Section 1.1 describes the threats and possibilities that derive from the use of algorithmic systems. The scope and aim of this dissertation are described in section 1.2. Section 1.3 describes the methods. The main section of this introduction is section 1.4, which summarises the dissertation articles and describes their background. Section 1.5 describes and summarises the core impact factors for this dissertation. It also summarises the answers to the core research question. Section 1.6 is the conclusion of the main part of this introduction. Section 1.7 mentions further avenues that the research conducted enables.

1.1 Current Applications of Algorithms in Public Intervention Systems

Applying algorithms in public regulation and public intervention can aid to allocate public resources according to the risk of the different entities to the particular system. By this, it can ease the burden of regulation for low risk entities, by providing targeted and proportionate public interventions (Rothstein, Huber and Gaskell 2006). Several central banks all over the world are currently working on different forms of Central Bank Digital Currencies (CBDC). These publicly issued digital currencies are still experimental. There is no generally accepted standard or objective for CBDCs. The discussion is still ongoing if wholesale digital currencies or general access currencies are more target-oriented to counter the destabilising developments in finance (Raskin and Yermack 2016; Norges Bank 2018). The systemic instability in this case derives from the quick pick-up rate of innovations in the financial markets. The declining use of cash as well as the increasing application of digital currencies are also reasons for the instability that is objectified by the potential introduction of CBDC (Bank of International Settlement 2018). The advocates of CBDC see a major potential in making central banks more accessible digitally, as monetary policy implications are most likely more pronounced if CBDC are an attractive asset to hold (Bank of England 2017). The algorithm-based public intervention system in the highly adaptive financial system holds great potential but is still in a theoretical and experimental stage.

Not in an experimental stage, but not yet satisfactory in their results are algorithms in health and higher-education systems in the United Kingdom (Griffiths 2017). In the health sector the algorithm-based risk assessment was found to be inefficient in determining the risk to the quality of care (Walshe and Phipps 2013). The system was updated and simplified to an indicator-based aggregation, but that system also failed to increase the precision of risk assessment. In fact, the results were so unreliable that it would have been better if the regulating entity had done the opposite of what the system suggested (Griffiths et al. 2016). Similarly, the higher-education supervision failed to implement an automated process in order to increase the reliability of predictions for their reviews of educational entities. The comprehensive data did not match the outcome of the reviews (Griffiths 2017). Crime-analysis tools, which are sometimes also called predictive policing, are also more and more common in the USA and in international police forces (Andrews et al. 2017). Algorithm based systems are used in Australia to optimise the social-service payments. The system led to a public scandal when it sent out unwarranted claims to recipients (Carney 2018). Algorithm-based tools are used more and more around the planet, but they are only at a very early stage, as these examples show.

A technologically based system is not always more efficient, especially if the costs of implementation, educating the people to use the new system and modernisation are taken into account (Smith and Wong 2016; Article VI). The qualitative level of the discussion of how algorithms and automated systems are and can be employed successfully differs in every sector, field and market. The common ground is that algorithm-based public-intervention is a developing niche in several fields, like economics, public administration, political science and sociology (Lodge and Mennicken 2017; Hildebrandt 2018). In most fields, like public administration (Cave 2016), financial market regulation (Treleaven 2015) and public policy (Andrews et al. 2017) the discussion is still within a very narrow circle of experts. The potential and the threats are highly disputed in governance (Lenglet 2011; Constâncio 2015; Smith and Wong 2016). While the more technology-focused entities, like central banks, are advancing the

discussions from purely theoretical to application-oriented in their fields (Robleh et al. 2014a; Bank of International Settlement 2018; Norges Bank 2018), most fields that are relevant to this dissertation are still not at this stage, as theoretical basics and general standards are missing (Griffiths 2017; Ziewitz 2016). Especially legally binding standards are widely disputed (Andrews et al. 2017; Hildebrandt 2018). It has to be noted that, in most fields, the topic has been gaining momentum and the quality of the particular discussion has been increasing over the last few years.

A public intervention tool can either focus on internal aspects of a public policy and interact only with public entities and systems, or it can intervene in private systems. Private systems, or systems in which at least one stakeholder is private, can be perceived as external to public agencies. Another axis of this differentiation are active and passive tools. Intervention tools are active in the sense that they intervene in a system and correct failures, regardless of whether the tool itself intervenes just once or constantly. This is contrary to analysis tools, which are predominantly passive in that they do not change the existing system.

For active public intervention tools, algorithmic systems are neither widely used nor intensively discussed. As algorithms are self-learning policy agents designed to correct systemic failures, they are not neutral. Arguably, application, design and development of any technology system is not neutral and needs political discussion (Latour 2002). For the purpose of this dissertation, algorithms are perceived as computational artefacts instead of purely mathematical constructs. A purely mathematical and hence technical construct would be neutral, but a computational artefact is not. A computational artefact needs to be designed and adapted to the user behaviour or the experience and necessities of the applying entity. An algorithm is a product of considerations about technical applicability, preferences and ideals. The design of any algorithm does not have to be neutral, as it can reflect an agenda (Ziewitz 2016), regardless of whether that agenda is conscious or unconscious. Successful applications of algorithms need to consider the political, social, economic and ethical consequences, especially as algorithms develop to become an increasingly more substantial part of society (Olhede and Wolfe 2018), which supports the perception that technology is only another layer of complexity.

1.2 Threats from Algorithmic Applications

The capabilities of algorithm-based policies and regulations are tremendous if applied correctly. The formerly extremely challenging task of allocating refugees, for example, has been optimised in several countries by employing algorithms (Quinn et al. 2018). The result was a drastic increase in the overall employment rate of the refugees in their particular region. The algorithm, in this case, was able to increase efficiency dramatically (Jasny 2018), but this does not have to be the case. Both private and public-sector entities are interested in the application of machine learning systems; however, not only is the technology itself and the management of cross-sector cooperation challenging, but the social and ethical aspects pose difficulties, as well (Hall and Pesenti 2017; Mikhaylov, Esteve and Campion 2018; Sonntag 2018). Many automated analysis systems are known to suffer from biases. Decisions based on machine learning models depend on the data that were used to train them. If the data are already biased, the machine will produce biased results. However, more indirect biases are possible through the design of the learning process (Veale and Binns 2017).

Generally speaking, constraining machine learning methods is how biases are challenged today. However, this is not always enough for those who suffer from the effects of the bias (Kusner et al. 2018). In recent debates, the discussion has become increasingly more detail-oriented. Potentially important differentiations have been made, such as a separation between code-driven and data-driven regulations, a differentiation that allows algorithms to be further grouped. It also generates a matching analysis and regulation (Hildebrandt 2018). Principles for accountability in algorithms have also been proposed, but they are not yet generally accepted or used for regulation in any significant way. First, awareness needs to be widespread. Every stakeholder needs to be aware of the potential bias of an algorithm. Second, the questioning and redress of algorithmic decisions should be encouraged by regulators. Third, institutions that use algorithms should be held accountable for the decisions made by the algorithms, even if the institutions are unable to explain the details of the decision-making process. Fourth, the way that underlying data are collected should be made public. Fifth, all steps of the decision-making process should be recorded to enable auditability. And ultimately, the methods to validate the models and results should be adapted continuously to allow for rigorous testing (USACM 2017).

However, these principles are just one side of the coin. Unconscious and conscious biases influence everything related to algorithms, especially if the growing ability of machines to learn the meaning of language and formulations is taken into account. An implicit bias can be transmitted without the source of the bias being aware of its existence. For example, a machine may acquire an implicit bias by formulating a topic or paragraph in a certain way, even if the bias was merely derived from the language itself (Caliskan, Bryson and Narayanan 2017). In the present, biases in algorithms are widespread. The issue is often trivialised, but a growing number of researchers and private institutions are facing the challenge and trying to force public attention towards the issue (DeepMind 2017; Knight 2017). Nevertheless, the future path of addressing the numerous sources of biases and the resulting privacy and fairness issues for machine learning is not yet clear, as best practice standards have not even been established yet (Brundage et al. 2018).

Not only are explicit and implicit biases of algorithms an issue, but social algorithms and the impact on the opinion formation of individuals through automated processes are a serious issue, too, especially if algorithms have the power to prevent users from accessing information with conflicting political views (Lazer 2015). The partially automated distribution of misinformation has also become increasingly important (Vicario et al. 2016). Factuality of information has never been a certainty, but social networks are able to facilitate the spread and manipulate the credibility of misinformation (Bakshy, Messing and Adamic 2015). Misinformation is spread purposefully and can be efficiently distributed through social bots, which can impact numerous topics, discussions and decisions, like the Brexit vote (Bastos and Mercea 2018) or the 2016 US election (Bessi and Ferrara 2016). Therefore, the concrete destabilising effect of ICT in each particular case has been disputed, but the influence as such has not (Ferrara et al. 2016).

Biases and data analysis issues have become particularly obvious in forecasting tools. In some examples, complex and established forecasting systems do not outperform a simple linear classifier, as is the case with a widely used risk assessment software for the US justice system (Dressel and Farid 2018). Experiments on the reliability of well-established risk-assessment software in the court system of the US have shown that

at least some established algorithms do not accomplish more reliable results than volunteers who are merely given a few essential parts of the information (Matacic 2018). Cases like these undercut the reliability of ICT-based prediction and analysis tools and make legal scholars sceptical, as the legal standards concerning reliability and accountability have not yet caught up with technology. A rash regulation of a not well-understood process would probably trigger worse results than a regulation that intervened at a late stage in the process (Hildebrandt 2018).

Transparency is one of the main challenges with algorithm-based systems, as these systems are often inherently complex and their logic and processes hard to follow. Up to this point, the processes have often been confidential (Datta, Sen and Zick 2017). The reasoning behind the decisions of machine learning algorithms is often difficult to explain. Standardised measures of the impact of particular parts of the data on the final results could be important to enable a certain transparency and, with that, the potential for fair results (Datta, Sen and Zick 2017). The currently predominant black-box manner in which AI systems are applied has been widely criticised, as it prevents understanding, discussion and evaluation of the results. This lack of transparency also prevents precise critique and improvement of the systems (Samek, Wiegand and Müller 2017). However, seeing the content of the black box, if that is at all possible, does not necessarily enable the analyst to understand every last detail of the process of a self-evolving system. Transparency as such is, hence, not the sole solution (Ananny and Crawford 2016).

1.3 Scope and Aim

For this dissertation, socio-economic systems are used as examples. The financial, the monetary and the political electoral systems are the core examples. The argument is developed in three core articles, which are complemented by background work in the appendix articles. All three approaches discussed in the dissertation papers aim to help to stabilise different core socio-economic structures, and each topic is crucial for the stability of modern-day democracies. Each topic was carefully selected to provide a sufficiently wide coverage of different systems in order to see under which circumstances algorithm-based public interventions can be successful in regulating and stabilising a system. It is also an objective to see how concrete algorithmic applications can be employed in different areas with their particular preconditions. Article **(I)** analyses a part of a system that is technologically far developed. It has a modern and highly flexible ICT infrastructure at its disposal. The financial system is a leading driver behind the development of new ICT-based systems. This paper discusses a purely interventional scenario, as the market of the credit-rating agencies is entirely private.

Article **(II)** discusses an issue in the same technological environment; however, digital currencies, particular public ones, are still very much in their infancy and do not yet have a well-established and widely used infrastructure within the financial markets. The existing structures and systems are private, but the core entity, the central banks, are public institutions. The discussion in article **(II)** is, hence, one about the changes in the existing relationship between private and public entities.

Article **(III)** discusses an issue that is purely public. Electoral systems are, in most countries, not a digitised process, and there is little to no infrastructure in this area. Article **(III)** discusses political institutions instead of economic ones, like articles **(I)** and **(II)**. These three cases were analysed to show the application of algorithm-based public

intervention systems in different circumstances, particularly in systems enduring systemic instability at the current point in time and systems with very different preconditions.

The research gap this dissertation aims to fill is, as mentioned, to determine if algorithm-based public intervention systems can effectively counter systemic instability. The following research question is at the core of this dissertation:

Under which conditions can algorithm-based public intervention systems be employed to counter systemic instability?

Two articles in the dissertation are focused on economic issues, while one addresses political, administrative and social components of the same issues. The thesis is interdisciplinary, written between the fields of economics, administration, governance, political science, computer science, law and innovation studies. As shown in the last section, an increasing number of researchers are approaching algorithms in complex issues (Kitchin 2017). However, applying algorithms and automation to regulations and policies is still the exception (Cave 2016), as many advances in this field come from the industry side (Dobusch, Mader and Quack 2013). Algorithms applied to public intervention are mostly used for analysis, and the applications are diverse. This thesis focuses more on the conceptual and systemic background than the technological design or technological application. The number of open questions and not-yet-clearly defined aspects in this field is so elevated that a theoretical model of the public application of algorithms in public intervention would not yet be helpful for research, as it would need to be extremely generic.

In order to approach systemic instability, it is important to evaluate the dynamics of the fundamental structures of the particular system. The condition of these structures was used as a point of reference. In all discussed systems, there are multiple aspects that might be the subject of ICT-based public interventions in order to improve existing public rules. The concepts of the articles are always focused on the most essential layer of each system. Identifying that layer in each case was one of the core challenges of this dissertation.

1.4 Methodology

All articles in this dissertation are conceptual and theoretical in nature. All three went through similar processes in their creation. A thorough literature review stood at the beginning of the creation (Hart 1998; Webster and Watson 2002) The objective of the review was to determine a research gap and to find the core issues that the particular system experiences.

Deductive and sometimes abductive reasoning, mostly based on Aliseda (2006), Overton (2013) and Ward (2009), led to the concepts presented in these papers. This theoretical dissertation and all its papers focus on practical issues, and due to the fact that there always is a gap between theory and practical application, some minor aspects of the concepts have to be speculative, as there are no pre-existing cases or proposals to rely on; however, these aspects are not crucial to the inner workings of the concepts. All speculative aspects are interchangeable with other solutions if a practical implementation should be considered. The direct relation to practical implementation and use was necessary in order to allow the identification of the crucial aspects that

algorithm-based public intervention systems require in order to have a chance of successful application.

In the search for matching cases a crucial determining factor was that the problems that occurred in the system occurred because of systemic instability. The focus lay on issues in which technology changed a structure, process, social perception or market and hence destabilised a system. The objective of the papers was then to investigate the core factors that help or prevent algorithm-based public intervention systems to counter systemic instability. This approach, with a technology and innovation focus, led to new solution concepts and new details for the presented tools. Similar approaches are relatively common in public administration research (Thiel 2014).

The literature review also had a second purpose, apart from the definition of the research gap: It identified the core strengths and weaknesses of the existing solutions. The constructs themselves are all created by a compilation and adaptation of existing proposals and an addition of modern technology. The composition combines the strengths of the pre-existing proposals in order to support the final concept in effectively resolving the core issues of the case. By doing so the concepts identified the key factors and conditions for algorithm-based public intervention systems. The identified factors and conditions did not only have to be found in all three articles of the dissertation, but also in the existing literature. Some existing practical cases of failure of algorithm-based public systems were included to verify the results, as discussed later.

The method for the determination of the crucial factors and conditions is difficult, due to the lack of reliable cases or even sufficiently advanced theoretical models. This dissertation made a first attempt to determine these factors as solidly as possible, but only future research and technological development will show if all aspects were found and if all determined ones will remain relevant.

1.5 The Articles – Short Summary and Background

Systemic instability comes in many forms. In the first article (I), the market for credit ratings was analysed. Credit rating agencies (CRA) perform a systemically relevant job for the economy that had been more or less unregulated until the economic crisis of 2007 (Utzig 2010). The publicly available risk assessment provided by the CRAs is a core influence for a significant share of investment decisions (Afonso, Furceri and Gomes 2012). Ratings also influence the cost of capital for sovereigns (Archer, Biglaiser and DeRouen 2007; Arezki, Candelon and Sy 2011). However, their performance in the crisis of 2008 did not meet the expectations of policymakers, investors and other important stakeholders (Dennis 2008; Akdemir and Kararli 2012). Some researchers even see CRAs as one of the core reasons for the development of the subprime crisis through their enabling of the exponential volume growth of subprime mortgage trade in the first place (White 2009; Hill 2011). Of the most important CRAs, Moody's rating, for example, modified reported financial statements (Kraft 2011). The unsatisfying performance of the agencies drew attention over the years, the most prominent of which were critiques in times of crisis. The Enron, subprime and the EU sovereign debt crises are only three famous examples (Hill 2002; Manns 2009; Eijffinger 2012), and all of them demonstrated systemic issues in the market. They also revealed that the warning that the market was supposed to provide was insufficient. These systemic problems have mainly been identified as market pressures (Kuhner 2001), accountability (Dennis 2008; White 2009), the oligopolistic market structure, (Hill 2002; Eijffinger 2012), the complexity of the rated

products (Skreta and Veldkamp 2009) and the payment structure of the CRAs (Sy 2004; Coffee 2011).

The particular interests towards these private entities in the field of finance stem from their public role as deputies of the state. The problem with such agents is that most states struggle to hold such entities accountable for their performance (Schwarcz 2002; Manns 2009). The international regulatory responses and the Basel regulations have also not significantly decreased the influence of the CRAs, which had been called for by many researchers in order to strengthen the self-evaluation of financial entities (Eijffinger 2012; Bank for International Settlement 2015). The European Securities and Markets Authority has taken on the difficult task of increasing the accountability of the CRAs within Europe. There are voices claiming that the intrinsic market problem will not be solved by these public agencies, as CRAs are incentivised to give generous ratings to sovereigns.

Numerous academic proposals are available, but none have been able to address all crucial aspects whilst keeping the market structure intact. The first article (I) provides that by introducing a distributive layer and an algorithm for the randomisation of the distribution of the ratings.

There is also no proposal that actively employs ICT to optimise the efficiency of an intervention. The first article (I) contains a proposal for a regulatory entity called the European Rating Fund (ERF). The purpose of the ERF is to reform the European credit rating agency market. The concept is that a public entity is created that takes over and randomises the distribution process of all ratings. The client is no longer searching for a provider but has one central entity to utilise. All products submitted for rating are distributed to and then processed by CRAs. The payment for the service of the CRAs is still coming from the issuer, but the payment is redistributed through the ERF. All direct contact between the issuer and the CRA is eliminated, and the prices are determined by an ERF-administered key.

The concept is developed on the basis of the strengths and weaknesses of numerous proposals, like user-fee proposals (Manns 2009) or by nationalising the rating agencies (Eijffinger 2012). Other proposals include the credit research initiative (Duan and Van Laere 2012) and the congressional report of the United States Government Accountability Office (GAO 2010), which proposes the elimination of the issuer-paid model with the help of a public entity. Other public CRA proposals, like Diomande, Heintz and Pollin (2009) or Schroeder (2013), have been used. Its novelty is not only the combination of factors used to redistribute the markets, but also the restructuring of the payment system. This proposal advances the existing literature, as it is the first reform proposal for the CRA market that tackles all major issues.

Another novelty and difference to the existing literature is that the design of the ERF facilitates the entry of new and less experienced CRAs through an automated and randomised distribution process. The distribution system is the most prominent influence that algorithms have in the concept of the ERF.

The ERF and its underlying algorithms are a first, elaborate, technologically based solution attempt for the issues of the CRA market. The contribution of this paper to the dissertation are the insights the theoretical construction of the ERF provides. The ERF is a public intervention that aims to regulate a source of instability for the entire financial system. It is essential that the algorithm-based public intervention systems focus on the core issues and that the presence of the algorithm-based intervention is known to the target market. It needs to be well communicated, clearly regulated, and the appropriate

knowledge of how to deal with the system needs to be spread. Side issues and concepts of nudging that are approached with algorithm-based interventions cannot be expected to be equally successful. All design attempts in these directions failed. The concept would not work without the application of algorithms, but the design also shows that algorithms alone are not and cannot be the solution. They are supportive structures in the case of public intervention whilst allowing the system to be more efficient and target-oriented. The ongoing and long-lasting discussion about the inefficiency of the market was a clear supportive factor for the creation of the algorithm-based public intervention system.

The second article **(II)** builds on the gap between digital currencies and monetary policy, which was particularly prominent at the time that most of this paper was written, in 2014 and 2015. How to design and apply central bank digital currencies (CBDC) and other applications of technologies deriving from digital currencies for monetary policy are unanswered questions (Bank of England 2017; Kumhof and Noone 2018). The Bank of England is one of the leading bodies in this research (Robleh et al. 2014a), but several other central banks, as well as the Bank of International Settlement and an increasing number of academics, have also been working on the issue. As in any currency, the possible applications of CBDCs would be numerous. Some unanswered questions are, who has access to the currency, and which design is preferable in what situation? A CBDC does not need to be a cryptocurrency, but it can be. The access could be limited to a distinct group of users. The currency could be used as wholesale or retail CBDC (Linnemann Bech and Garratt 2017).

The market for and attention to digital currencies grew tremendously over the period of the review process for this article. Luckily, nowadays everybody seems to agree that a CBDC cannot be pictured like Bitcoin (Coeure and Loh 2018). Most practitioners and researchers in monetary policies had not yet considered digital currencies as a potentially significant impact three years ago, as the now-famous term “distributive ledgers” was just starting to receive attention back then. Even now, many questions have not yet been answered in this area. The field of CBDCs, in which article **(II)** falls, is now strongly developing. The field has emerged since the sub-prime crisis. The discussed possibilities for CBDCs might become a welcome addition to the current unconventional monetary policies. These policies are particularly determined by active monetary policies with low or negative interest rates and programmes such as Quantitative Easing (QE) or the Public Sector Purchase Programme (PSPP). Both of those programmes have the objective to provide the financial sector with enough liquidity to prevent another shortage of currency in the markets, which, in turn, is supposed to lead to an increased lending activity of private banks. Under the PSPP, the euro system buys public and private bonds directly, whilst under QE, the central bank buys mostly public bonds from private banks that are holding them on a secondary market.

The interest in digital currencies created by the state arose later. The field is very diverse, and the interest and focus depends on the particular approach of the central bank (Fung, Hendry and Weber 2018; Kumhof and Noone 2018). Still today, Article **(II)** fills the gap of what a first step into a CBDC could look like. The other crucial question that is addressed by the article has also been posed by numerous other publications: What applications would be possible for CBDCs or similar adaptations (Grym et al. 2017; Meaning et al. 2018)?

Article **(II)** discusses an ICT-based monetary reaction tool that enables supervisory entities and central banks to trace and even direct monetary flows towards a certain segment of the European financial system. The concept is a mixture between CBDCs and

macroprudential policy. The paper proposes two tools: Monetary Tracking (MT) and Monetary Restricting (MR). Both tools would be obligatory for all private banks, if introduced. The concept builds on the fact that a significant number of the largest banks in the world have united in an effort to further the development of distributed ledger-based inter-banking communication and trade (R3 2018). The progress of such technologies is hence practically unstoppable. If such a system is to be employed, supervising entities will need to gain an insight into this system in order to enable a continued oversight over the markets and their size and activities (Pozsar et al. 2010; Robleh et al. 2014b). Therefore, marked money can be issued as a certain share of the total electronic money issued by the ECB. A simplified version of the system is also applicable if the ledger-based system is not implemented. Every bank in a particular region or market would receive a certain share of its money as MT- or MR-marked money. Therefore, the private bank would have no choice but to accept the MR money. MT is a passive control tool that provides insight into the markets. In times of growing monetary competition and the exponential growth of shadow banking activities, it is becoming increasingly hard for supervising entities to keep a realistic picture of market transactions and connections (Singh and Pozsar 2011). Such an insight could be provided by an identification of single electronic coins via an identification code pinned to a particular coin or group of coins. Monetary tracking allows tracking and a more profound market supervision, but a similarly important potential of the system consists of the intervention tools that are based on the same technology. MR is a tool that enables the central bank to channel money indirectly to a certain market or region. The marked money would only be allowed to be invested into a certain kind of company, market or region. The tool requires massive regulations and limitations to limit the dangers of the concept. The paper also shows that an adequate transparency for algorithm-based systems always requires additional and rigorous checks for conscious and unconscious biases, as well as an open eye for criticism from any stakeholders.

The ECB and other central banks have employed macroprudential policies since the sub-prime crisis, which comprises a form of policy that is supposed to mitigate the market-wide risk. This not technologically based form of public intervention is also able to distribute credit and liquidity to the market, but its distribution abilities are not as precise as traceable currency would be.

This paper also explains that distributed ledgers have the potential to circumvent public supervision and the clearinghouse function of the central bank, which is a massive loss of public influence through innovation (Robleh et al. 2014a). For the dissertation the concepts of this paper emphasise the issues of a necessary infrastructure. Algorithm-based public intervention systems can only excel if the infrastructure is sufficiently advanced. It also supports the need for clear and strong regulation and restrictions of the algorithm-based public intervention systems, which the ERF also clearly required. The research for this paper showed that the use of existent technologies that, if possible, are already used in the system should be employed in order to save costs and guarantee efficiency. It, of course, also emphasises the need of focusing on essential issues in order to be able to argue for the additional expenses and issues of complexity.

In order to evaluate if and how ICT-based systems are applicable to political systems, the third article (III) focuses on election systems. Democracy, as most other systems of human interaction, is changing through technology. Up to this point, no existing system has really been able to engage with the increasing number of politically passive citizens, which is a phenomenon in most Western democracies (Ahmad 2015; Dahl et al. 2018).

Therefore, the concept presented in article (III) aims to achieve this. The same logic as in the other two articles applies: Can ICT, in the hand of the state, stabilise destabilising effects in the political sphere, as well? Destabilising effects are indirect in this case. Political apathy, political abstention, artificial and distorting opinion creation as well as misinformation are only some of the destabilising effects in this system.

In the first paper, the destabilising effects of technology are direct: The market itself changed. The topic of the second paper is subject to direct and indirect destabilisation. Cryptocurrencies are developing as a direct impact on the monetary system and monetary politics. However, more importantly, the financial system is changing fundamentally through technology, and classical prudent monetary policy is becoming increasingly less effective without surrounding micro and macro prudential tools. In article (III), the destabilisation is indirect, as democracy is not directly impacted by technology, but rather the information available to the public and the new means of communication are able to rapidly change public opinion (Freiberg 2012). It is also harder to keep information about events in the world from the public or maintain a narrative of events and causes (Robinson 2001), which changes politics and people's expectations towards certain issues and politics in general, which is a form of political abstention (Power 2004).

Public expectations in public services and the relation between the state and the public has changed through the rise of electronic systems. One crucial system for any democratic system has yet to change fundamentally: elections. Elections are still relatively similar to the way they were a hundred years ago. Of course, there have been adaptations to the processes. However, all e- and i-voting related changes are not fundamental to the level of democratic interaction between the citizens and the elected officials. The elections in every country still take place every few years, and, in the meantime, the population is basically without influence. The population still only has the chance to express opinions through packages offered by the political parties. The preferences of the individual are generally not correctly aggregated, and there is no way for the population to show dissatisfaction with a single position of a party on a particular issue (Rae and Daudt 1976). The distance between the voting population and the elected officials is not getting smaller, whilst the people are becoming increasingly more used to individualised solutions and direct communication in other fields, like education (Nikolopoulou and Gialamas 2016), medicine (Kunapareddy et al. 2018) or the vast variations in e-commerce (Wang 2016; Stark, Ibáñez and Parreno 2018). In democratic processes, this possibility for the quick engagement of the individual has not yet happened, except for the petition platforms that several states have introduced (Petitionsstelle des Deutschen Bundestages 2015).

Both e-voting and i-voting systems face massive hurdles and technological issues. The reasons why only such a small number of countries employ i-voting applications stem from numerous social, infrastructural and technological issues. Social issues are, among other things, the level of e-literacy among the population or the trust of the people in their government and the administration (Carter and Bélanger 2005; Morris 2007). Infrastructural issues develop around the availability of the internet (Hassan and Zhang 2013), legal concerns (Mitrou, Gritzalis and Katsikas 2002) and the spread of surrounding hardware, like secure login mechanisms (Madise and Martens 2006). For academia, most unresolved issues come from the technological side, the main issue being the verifiability of the vote (Krimmer 2016). It is a challenge for both e-voting and i-voting, but the transmission through the internet makes it even more complex for

i-voting. A vote that was cast electronically needs to be able to show that it was cast, transmitted and accounted as intended by the voter, without violating the privacy of the vote (Schwarzer and Wallner 2009). The technicalities of these challenges are highly complex, and the right approach has been strongly disputed among researchers and practitioners (Teague and Wen 2012; ECNSW 2016). There are only a few papers that move past these challenges to try to shape the future of the technology. In the area of what e-voting and i-voting could or should achieve, the discussion is limited. This discussion is crucial to determine the future of technology, as the results of an election are significantly determined by the modalities and details of the particular electoral system (Alvarez et al. 2004; OSCE/ODIHR 2011).

The third article (III) is targeted at creating a discussion on the objectives and possibilities of e-voting and i-voting. Which developments in e-voting are desirable and which are not? Which modalities need to be taken into account, and which could enable more public engagement? A mere adaption of the means used to vote without an adaptation of the actual voting, election and analysis process is unlikely in the long term. The proposal of this paper is called Democratic Intervention (DI). A system that takes the concept of recall elections and puts it into the digital age, DI is a continuous, controlled, real-time analysed, technologically based election mechanism that counts votes negatively and enables the population to vote in or out members of parliament, political parties and even the government – everything under strict regulation of course. At the same time, the tool provides politicians with a feedback mechanism for their actions and statements.

DI advances the discussion on the abilities of future elections. It is a continuous addition to the pre-existing election system that remains in place. Votes can be cast and erased at any point in time and as often as one pleases. However, whilst the recasts of votes are unlimited, the number of votes cast at the same time are not. The votes that the individual voters are allowed to cast are limited in relation to the number of eligible persons or parties in a particular category. This prevents anyone from voting against all parties or every single member of parliament. The limitation is in place to enforce a conscious vote and election process. The changes in the votes are counted in real time, and every citizen is able to see the current standings of the continuous election. If a certain benchmark of votes is accumulated against a representative or government, the particular person loses their seat in parliament or their position in government. If the government itself reaches the predefined benchmark, re-elections are triggered. The votes are cast online, and the accumulation and analysis of data needs to happen in real time in order to fulfil the purpose of DI. The system triggers a response as soon as a benchmark is reached, even if it is only for a millisecond. Although this might seem unfair, in a system in which the population has enough time to support their candidates ahead of a critical period, reaching the benchmark should be sufficient. Of course, a certain period above the benchmark could also be a sensible solution, depending on the preferences of the accountable personnel.

Internet-based, remote and flexible elections will gain a greater influence over the coming decades, but many questions need to be answered before systems can be introduced worldwide. Article (III) contributes to the elaboration of i-voting systems. The chances and dangers are clearly elaborated in this paper. This concept also shows that ICT-based public systems always provide great opportunities but also threats, especially if they deal with such essential processes as elections.

Before systems like DI could or should be introduced, the current issues with e-voting, and particularly i-voting, need to be overcome **(IV)**. A prerequisite for the introduction of any e-service is a sufficiently advanced infrastructure and widespread e-literacy. For a successful application of algorithm-based public intervention systems the particular target group needs to be able to deal appropriately with the system. It is also helpful if the system takes on a dominant presence, has clear rules, and the communication surrounding the tool is clearly defined. This prevents circumvention and facilitates penalties for those who circumvent the system intentionally.

1.6 Determining the crucial factors

In addition to their individual findings the three articles emphasise several factors as being crucial for the successful application of algorithm-based public intervention systems. All of these factors are derived from theoretical methods. Not all of them are empirically confirmed yet. Many of these factors have already been found in other papers by other researchers, and all of the issues are connected. They even overlap in certain points. Each factor will be illustrated with an example from one of the 3 papers:

First, if the system that is to be regulated does not have a sufficiently advanced and standardised ICT infrastructure, algorithm-based tools cannot be effectively implemented and might not fulfil the system's needs. An algorithm-based tool can only develop its full potential if the entire system which is to be regulated can be reached, and if the system is actually using a sufficiently developed ICT infrastructure. There is no point in creating an algorithm-based public intervention system if the regulated system employs numerous different and incompatible ICT structures or even no or weak ICT systems. In such a system, an algorithm-based tool might be unable to perform at all and it might even be unable to reach significant parts of the system (Article **II**; **III**; Griffiths 2017). The most obvious example for issues like these is internet-based voting, which is simply not possible without the necessary technological infrastructure. If a system cannot be sufficiently accessed, secured or scaled it is simply better not to introduce it at all **(III)**.

Second, algorithm-based public intervention systems should tackle crucial issues in a destabilised system. If they do not address a crucial point of the system, they might be overpowered or even entirely ineffective. The ongoing need for maintenance and investment does not make it advisable to use algorithm-based public intervention systems for unessential issues. If a systemically not relevant point is targeted, it is most likely that the instability will not be effectively resolved. The potential additional costs for the administration and the stakeholders make such an intervention rather unappealing. The unique abilities of algorithm-based systems allow them to stabilise complex systems rather effectively, if they target essential points within these systems. The difficulty of identifying any aspect as crucial is the most profound challenge here, which requires cooperation between the designing team and experts of the particular field. An issue that can be quite problematic as organisational barriers and personal biases need to be accounted for, in the design of the algorithm (Article **I**; **II**). If the ERF were to target only the distribution of credit ratings, but not the contracting or issuing process as well, it would be a tool that could not resolve the crucial conflicts of interest of the market. In this case the ERF would actually do nothing to stabilise the market, except, maybe making the distribution more efficient **(I)**.

Third, the required human capabilities must exist, which includes general e-literacy and knowledge of the particular system and its administration. The stakeholders, or at least those who are directly involved, need to be able to understand the system, its purpose and its consequences. They also need to be able to identify misinformation and generalisations (Article II; III; Morris 2007; Ziewitz 2016). If this is not possible or the system is not understood, the acceptance for the system will be minimal and with that the long-term success might be at risk. Any system requires a minimal level of long-term acceptance in order to remain in place and achieve its objective. The target market needs to be able to understand and work with the technology based system. It is not only the target market, but also the administration and all directly involved stakeholders need to be able to understand the handling and the consequences of the technology. A system will not get used or will lead to dissatisfaction if it is not understood. Just introducing a new election method does not necessarily increase the participation, if the necessary knowledge and capabilities do not exist (III).

Fourth, qualitative support needs to be provided to the algorithm. This qualitative support can be distinguished in clear rules, clearly determined regulations and regulatory policies, as well as clear and standardised communication with and about the system. Qualitative support is necessary to prevent malperformance of the algorithm used for an algorithm-based public intervention tool. The limits of an unregulated algorithm, especially if it is a self-learning or adapting system, are not necessarily clear and can lead to undesired expansions and developments. An algorithm that is implemented in a social, economic or political system can alter the system tremendously. If an algorithm is created without any surrounding rules, regulations and regulatory policies, the reach, function and power of the system is potentially undetermined.

The aspect of a clear legal framework begins on a very basic level. It is also already required for the adoption of the tool. The framework needs to develop from these basic aspects towards highly detailed questions and nuances in the continuing application of the tool. These precise regulations and regulatory policies are required to prevent intentional or unintentional overstepping of powers and purposes from both sides. These regulations and regulatory policies have to clarify the power and area of the algorithm for all sides.

To put it simply, an algorithm that is supposed to interfere in the distribution and payment system of the credit rating market should not be allowed to use the gathered data to alter the system further than intended. The rule-based determination of the algorithm also increases its acceptance among stakeholders, as the rules explain the powers and limits of the algorithm. The surrounding system and its design are crucial for the success as they can create a legal basis, trust and reliability in the system. In order to prevent the solution from becoming a problem itself, every algorithm-based system needs a regulatory and policy-based structure around it. This structure has to be very precise and well-discussed in order to prevent an unwanted change of objective or an unwanted increase in range of the tool. It is also needed to enable a mechanism which is able to resolve issues of the tool quickly.

Standardised communications about and with a system make misunderstandings and malperformances less likely. The surrounding set of rules, regulations and regulatory policies should state the correct way of communicating with the system, if necessary (Article I; II; III; Olhede and Wolfe 2017). An example for this issue is the MR paper, the monetary tool that could even be dangerous for the markets and the economy if it is not clearly and strictly regulated. The review process of the paper was dominated by

discussions about precise regulations, niche questions and potential consequences of the regulations **(II)**. In the same case and in the general sphere of CBDCs a standardisation of the communication happened through the increasingly intensive discussions over the last few years.

Fifth, neither the technology nor the regulatory surrounding design should be a reason for a lack of transparency. Transparency in both layers must be provided to enable trust in the systems. An adequate transparency for algorithm-based systems also requires rigorous checks for conscious and unconscious biases, as well as an open eye for criticism from stakeholders regarding potential biases. All articles show that the design behind the algorithm and its system is not neutral or independent, which makes transparency and error-correcting feedback mechanisms within the software, as well as the surrounding system, even more essential (Article I; **III**; Ananny and Crawford 2016; Matacic 2018). A former design of the ERF significantly disadvantaged the three big rating agencies (Standard & Poor's, Moody's and Fitch). This had to be pointed out only in one of the last review rounds of the paper. Hence sufficient external and independent control is crucial to avoid biases, regardless if they are conscious or unconscious **(I)**.

Sixth, funding and an appropriate time frame for developing and testing algorithm-based solutions is necessary in order to prevent a malfunctioning or underperforming system. The strength of algorithm-based systems, their velocity and power, can be their downfall, if the system is not sufficiently tested and developed, as the damages caused by a pre-emptive introduction can be tremendous, both in reputation and monetary terms. Reputation can be lost for the administration introducing the system and all following systems, as the trust in algorithm-based systems is lost and needs to be rebuilt slowly. Depending on the regulation, all sides might suffer financially. In the case of state-internal systems, like elections, the financial burden lies with the state, but in the case of external systems the potential damage extends far beyond the state level, all participants in the system might get damaged or lose money, just because the time, knowledge and money invested in the design of the algorithm-based public intervention system was insufficient (Article I; **II**; **III**; Lodge and Mennicken 2017). MR, the digital currency tool, would be problematic, if not dangerous, if it was not sufficiently thought through and tested **(II)**. The insufficient testing and too optimistic introduction of a not yet efficiently working system is also one of the reasons why the algorithm assessing risk in the health care sector of the United Kingdom failed in the beginning, as mentioned above (Walshe and Phipps 2013).

Each of the factors can be found in the three cases, but also in several of the appendix papers. Each dissertation paper brings a different point of view to the discussion, and each paper emphasises the importance of singular aspects. With a closer look all papers show these six points as the crucial aspects for a successful and target-oriented introduction of algorithm-based public intervention systems.

1.7 Conclusion

Intervening in innovation-focused systems, as the ERF **(I)** and MR **(II)** attempt to do, is an equally challenging task as intervening in a purely state-internal system, as the paper on DI **(III)** does. The difference is that state-internal systems are not necessarily required to keep up with the innovation of the external system. The necessary continuous technological adaptation makes state external systems more challenging in the long run. The velocity of change that the particular systems endure, or enjoy, makes

the adaptation of algorithm-based intervention systems harder, but it can also make them more efficient in comparison to conventional systems if they are well-designed. Technological development can hence be both a hurdle and a supportive factor. The synthesis of the three articles leads to the identification of common success factors, or hurdles.

This dissertation has shown that algorithm-based active intervention tools are applicable to both public internal and external systems. The work also underlines that systemic instability can be countered by algorithm-based public intervention if the intervention systems are appropriate for the particular systems and tasks, according to the factors identified above. Algorithm-based public intervention systems can be appropriate if the issue at hand is complex and not resolvable with structural reforms or rule-based regulations.

The efficiency of algorithm-based public intervention systems largely depends on their appropriate application and design. This dissertation provides a first composition of crucial hurdles and success factors for the introduction of algorithm-based public intervention systems in cases of systemic instability. These systems can be employed for issues unrelated to systemic instability as well, but the papers have shown that the complexity of systemic instability is an objective that justifies the additional expenditures and efforts for the application of algorithm-based public intervention systems. The dissertation shows that algorithm-based public intervention systems are able to address complex issues. They are ideal for complex challenges, as they facilitate and increase the velocity of data analysis and reaction time. They are also as objective as their design, which means that the interpretation does not depend on a change in positions. The discussion about such systems needs to intensify in order to enable states to be competitive with the fast-developing, ICT-based innovation in the private sector and private systems. In order not to depend on private expertise, academia and the states need to intensify and speed up the discussion as well as the development of such systems and find a common basis in order to determine the effectiveness and adequacy of the individual tool for a particular case.

1.8 Avenues for Future Research

In general, ICT-based public interventions, including predictive regulation, will require much more research in order to achieve an appropriate level for a possibly rapid policy response.

Another step that develops from this thesis is a profound look into the development of the monetary system and public administration of this aspect, particularly under the influence of ICT. Cryptocurrencies are a starting point here, including the impact of public cryptocurrencies and micro-application currencies, like KodakCoin for photographers. CBDC are and will be an increasingly important topic for central banks and scholars working on monetary policy, as many fundamental questions have not yet been answered.

All proposed systems require a detailed structure to enable an actual implementation, which could be an interesting task if one of the proposals finds sufficient discussants. Advancing these and similar public tools would also enable the creation of a theoretical tool for the creation and implementation for algorithm-based public interventions.

ICT-based systems can also intervene in markets without introducing a monopolistic control into the markets. One attempt of that would be a theoretical standardisation of

systems with a platform approach like the one discussed in depth in the paper on the European Rating Fund. Such intervention and randomised or impersonal distribution platforms could be solution attempts for many aspects of a modern economy, like public contracts or the prevention of misuse of market power in oligopolistic, mixed or monopolistic markets. Such platforms can also lead to a more proficient feedback system for representatives and hence develop democracies, which was hinted at in article (III). The avenues for future research in e- and i-voting are wide open. The field is far from resolving the major issues. Crucial aspects in the developing aspects of universal verifiability, cyber security and infrastructural issues remain unsolved. Standards and measures of best practices also need to be regularly updated. At the same time, empirical evaluations of existing negative voting systems might be interesting to pursue in order to achieve more political engagement and a more direct representation of the will of the people.

Abbreviations

AI	Artificial Intelligence
CBDC	Central Bank Digital Currency
CRA	Credit Rating Agency
e-voting	Electronic Voting
i-voting	Internet Voting
ICT	Information and Communication Technology
PSPP	Public Sector Purchase Programme
QE	Quantitative Easing

References

- Afonso, António, Furceri Davide, Gomes Pedro. 2012 "Sovereign credit ratings and financial markets linkages: Application to European data" *Journal of International Money and Finance* 31 (3): 606–638.
- Ahmad, Saeed. 2015. "Role of Socioeconomic Status and Political Participation in Construction of Apathy Among Youth." *Journal of Human Behavior in the Social Environment* 25 (8): 801–809.
- Ait-Sahalia, Yacine, Jochen Andritzky, Andreas Jobst, Sylwia Nowak, and Natalia Tamirisa. 2009. "How to Stop a Herd of Running Bears? Market Response to Policy Initiatives during the Global Financial Crisis." *IMF Working Papers* 204.
- Akdemir, Ali, and Durdu Kararli. 2012. "An Assessment of Strategic Importance of Credit Rating Agencies for Companies and Organizations." *Procedia – Social and Behavioral Sciences* 58: 1628–1639. <https://doi.org/10.1016/j.sbspro.2012.09.1150>.
- Alessandri, Piergiorgio, Prasanna Gai, Sujit Kapadia, Nada Mora, and Claus Puhr. 2009. "A Framework for Quantifying Systemic Stability." *International Journal of Centralbanking* 5 (3): 47–81.
- Aliseda, Atocha. 2006. *Abductive Reasoning – Logical Investigations into Discovery and Explanation*. Vol 330.
- Alvarez, R. Michael, Melanie Goodrich, Thad E. Hall, D. Roderick Kiewiet, and Sarah M. Sled. 2004. "The Complexity of the California Recall Election." *PS: Political Science and Politics*. American Political Science Association. <https://doi.org/10.2307/4488756>.
- Ananny, Mike, and Kate Crawford. 2016. "Seeing without Knowing: Limitations of the Transparency Ideal and Its Application to Algorithmic Accountability." *New Media & Society* 20 (3).
- Andrews, Leighton, Bilel Benbouzid, Jeremy Brice, Lee A Bygrave, David Demortain, Alex Griffiths, Martin Lodge, Andrea Mennicken, and Karen Yeung. 2017. *Algorithmic Regulation*. London School of Economics and Political Science Discussion Paper. London: CARR – Centre of analysis of risk and regulation, London School of Economics and Political Science.
- Archer, Candace C., Glen Biglaiser, and Karl DeRouen. 2007. "Sovereign Bonds and the 'Democratic Advantage': Does Regime Type Affect Credit Rating Agency Ratings in the Developing World?" *International Organization* 61 (02): 341–365. <https://doi.org/10.1017/S0020818307070129>.
- Arezki, Rabah, Bertrand Candelon, and Amadou N R Sy. 2011. "Sovereign Rating News and Financial Markets Spillovers: Evidence from the European Debt Crisis." *IMF Working Paper* 11 (68): 1–27. <https://doi.org/10.5089/9781455227112.001>.

- Bakshy, Eytan, Solomon Messing, and Lada A. Adamic. 2015. "Exposure to Ideologically Diverse News and Opinion on Facebook." *Science* 348 (6239): 1130–1132.
- Bank for International Settlement. 2015. "Revisions to the Standardised Approach for Credit Risk – Basel Committee on Banking Supervision."
- Bank of England. 2017. "Digital Currencies – Bank of England." Bankofengland.Co.Uk. 2017. <http://www.bankofengland.co.uk/research/Pages/onebank/cbdc.aspx>.
- Bank of International Settlement. 2018. "Central Bank Digital Currencies Committee." <https://www.bis.org/cpmi/publ/d174.pdf>.
- Bastos, Marco, and Dan Mercea. 2018. "The Public Accountability of Social Platforms: Lessons from a Study on Bots and Trolls in the Brexit Campaign." *Philosophical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 376 (2128).
- Benes, Jaromir, and Michael Kumhof. 2012. "The Chicago Plan Revisited." *IMF Working Papers* 12 (202): i. <https://doi.org/10.5089/9781475505528.001>.
- Bessi, Alessandro, and Emilio Ferrara. 2016. "Social Bots Distort the 2016 US Presidential Election Online Discussion." *First Monday* 21 (11): 14.
- Brundage, Miles, Shahar Avin, Jack Clark, Helen Toner, Peter Eckersley, Ben Garfinkel, Allan Dafoe, et al. 2018. "The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation."
- Caliskan, Aylin, Joanna J. Bryson, and Arvind Narayanan. 2017. "Semantics Derived Automatically from Language Corpora Contain Human-like Biases." *Science* 356 (6334): 183–186.
- Carney, Terry. 2018. "The New Digital Future for Welfare: Debts Without Legal Proofs or Moral Authority?" *Sydney Law School Research Paper* 18 (15): 1–16.
- Carter, Lemuria, and France Bélanger. 2005. "The Utilization of E-government Services: Citizen Trust, Innovation and Acceptance Factors." *Information Systems Journal* 15 (1): 3591–3601.
- Cave, Jonathan. 2016. "Regulation by and of Algorithms." *SSRN* 3 (04).
- Coeure, Benoit, and Jacqueline Loh. 2018. "Bitcoin Not the Answer to a Cashless Society." *European Central Bank Opinion*.
- Coffee, John C. Jr. 2011. "Ratings Reform: The Good, the Bad and the Ugly." *Harvard Business Law Review* 1 (231).
- Constâncio, Vítor. 2015. "Monetary Policy Challenges in the Euro Area – The Power of Policy: Solving Problems and Shaping the Future." *Annual Conference of the Marshall Society*.

- Dahl, Viktor, Erik Amna, Shakuntala Banaji, Monique Landberg, Jan Serek, Norberto Ribeiro, Mai Beilmann, Vassilis Pavlopoulos, and Bruna Zani. 2018. "Apathy or Alienation? Political Passivity among Youths across Eight European Union Countries." *European Journal of Developmental Psychology* 15 (3): 284–301.
- Datta, Anupam, Shayak Sen, and Yair Zick. 2017. "Algorithmic Transparency via Quantitative Input Influence." In *Transparent Data Mining for Big and Small Data Vol.32*, 71–94. Springer.
- DeepMind. 2017. "DeepMind Creates Research Unit on Ethics and Social Effects of AI." DeepMind. 2017. <https://deepmind.com/applied/deepmind-ethics-society/>.
- Dennis, Kia. 2008. "The Ratings Game: Explaining Rating Agency Failures in the Build Up to the Financial Crisis." *University of Miami Law Review* 63 (1111).
- Diomande, M. Ahmed, James S. Heintz, and Robert N. Pollin. 2009. "Why U.S. Financial Markets Need a Public Credit Rating Agency." *The Economists' Voice* 6 (6). <https://doi.org/10.2202/1553-3832.1507>.
- Dobusch, Leonhard, Philip Mader, and Sigrid Quack. 2013. *Governance across Borders Transnational Fields and Transversal Themes*. Cologne: Max-Planck Institute for the Study of Societies.
- Dopfner, Kurt. 2005. *The Evolutionary Foundations of Economics*. Edited by Kurt Dopfer. Cambridge University Press.
- Dressel, Julia, and Hany Farid. 2018. "The Accuracy, Fairness, and Limits of Predicting Recidivism." *Science Advances* 4 (1): 1–5.
- Duan, Jin-Chuan, and Elisabeth Van Laere. 2012. "A Public Good Approach to Credit Ratings – From Concept to Reality." *Journal of Banking & Finance* 36 (12). Elsevier B.V.: 3239–3247. <https://doi.org/10.1016/j.jbankfin.2012.03.012>.
- ECNSW. 2016. "iVote." Electoral Commission NSW. 2016. <http://www.elections.nsw.gov.au/voting/ivote>.
- Eijffinger, Sylvester C W. 2012. "Rating Agencies: Role and Influence of Their Sovereign Credit Risk Assessment in the Eurozone." *Journal of Common Market Studies* 50 (6): 912–921. <https://doi.org/10.1111/j.1468-5965.2012.02289.x>.
- Ferrara, Emilio, Onur Varol, Clayton Davis, Filippo Menczer, and Alessandro Flammini. 2016. "The Rise of Social Bots." *Communications of the ACM* 59 (7): 96–104.
- Freiberg, Phillip. 2012. "The Role of the Internet in the December 2011 Moscow Protests." *SSRN* 24 (January): 88.
- Fung, Ben, Scott Hendry, and Warren E. Weber. 2018. "Swedish Riksbank Notes and Enskilda Bank Notes: Lessons for Digital Currencies." *Bank of Canada Staff Working Paper*. Vol. 27.

- GAO. 2010. "United States Government Accountability Office – Report to Congressional Committees – Securities and Exchange Commission."
- Griffiths, A., A.-L. Beaussier, D. Demeritt, and H. Rothstein. 2016. "Intelligent Monitoring? Assessing the Ability of the Care Quality Commission's Statistical Surveillance Tool to Predict Quality and Prioritise NHS Hospital Inspections." *BMJ Quality & Safety* 26 (2): 120–130.
- Griffiths, Alexander. 2017. "The Practical Challenges of Regulating the Quality of Public Services with Algorithms." In *Algorithmic Regulation*, 19–24.
- Grym, Aleks, Heikkinen Päivi, Karlo Kauko, and Kari Takala. 2017. "Central Bank Digital Currency." 5/2017. BoF Economics Review.
- Hall, Dame Wendy, and Jérôme Pesenti. 2017. "Growing the Artificial Intelligence Industry in the UK." London. <https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk>.
- Hart, Chris. 1998. *Doing a Literature Review: Releasing the Social Science Research Imagination*. Sage.
- Hassan, Ahmed, and Xiaowen Zhang. 2013. "Design and Build a Secure E-Voting Infrastructure." In *IEEE Long Island Systems Applications and Technology Conference (LISAT)*.
- Hermann, Christoph. 2017. "Crisis, Structural Reform and the Dismantling of the European Social Model(S)." *Economic and Industrial Democracy* 38 (1): 51–68. <https://doi.org/10.1177/0143831X14555708>.
- Hildebrandt, Mireille. 2018. "Algorithmic Regulation and the Rule of Law." *Philosophical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 376 (2128).
- Hill, Claire A. 2002. "Rating Agencies Behaving Badly: The Case of Enron." *Connecticut Law Review* 35.
- Hill, Claire A. 2011. "Limits of Dodd-Frank's Rating Agency Reform." *Chapman Law Review* 15 (1).
- Jasny, Barbara R. 2018. "Data-Driven Refugee Assignment." *Science* 359 (6373): 285.
- Kitchin, Rob. 2017. "Thinking Critically about and Researching Algorithms." *Information, Communication & Society* 20 (1): 14–29.
- Knell, Mark. 2014. "Schumpeter, Minsky and the Financial Instability Hypothesis." *Journal of Evolutionary Economics*, 293–310. <https://doi.org/10.1007/s00191-014-0370-8>.

- Knight, Will. 2017. "Biased Algorithms Are Everywhere, and No One Seems to Care." *MIT Technology Review* 12 (07).
- Kraft, Pepa. 2011. "Rating Agency Adjustments to GAAP Financial Statements and Their Effect on Ratings and Bond Yields." Stern School of Business. <https://doi.org/10.2308/accr-50858>.
- Kregel, Jan. 2012. "Using Minsky to Simplify Financial Regulation." In *Levy Economics Insitute of Bard College*. Vol. April. New York.
- Krimmer, Robert. 2016. "Verifiability: A New Concept Challenging or Contributing to Ecisting Election Paradigms." *Not yet Published*.
- Kuhner, Christoph. 2001. "Financial Rating Agencies: Are They Credible? – Insights into the Reporting Incentives of Rating Agencies in Times of Enhanced Systemic Risk." *Schmalenbach Business Review* 53 (January): 2–26.
- Kumhof, Michael, and Clare Noone. 2018. "Central Bank Digital Currencies – Design Principles and Balance Sheet Implications." 725. Staff Working Paper.
- Kunapareddy, Girish Chandra, Benjamin Switzer, Pramod Pinnamaneni, Joseph Hooley, Leticia Varella, and Christa Poole. 2018. "Implementation of Individualized Care Plans in High Risk Oncology Patients: A Team Based Model to Decrease Unnecessary Utilization." *Journal of Clinical Oncology* 36 (15): 6547.
- Kusner, Matt J, Chris Russell, Joshua R. Loftus, and Ricardo Silva. 2018. "Causal Interventions for Fairness." Preprint. Work in Progress.
- Latour, Bruno. 2002. "Morality and Technology – The End of the Means." *Theory, Culture & Society* 19 (5/6): 247–260.
- Lazer, David. 2015. "The Rise of the Social Algorithm." *Science* 2 348 (6239): 1090–1091.
- Lee, Heejin, and Edgar a. Whitley. 2002. "Time and Information Technology: Temporal Impacts on Individuals, Organizations, and Society," no. June 2015: 37–41. <https://doi.org/10.1080/01972240290075084>.
- Lenglet, Marc. 2011. "Conflicting Codes and Codings: How Algorithmic Trading Is Reshaping Financial Regulation." *Theory, Culture & Society* 28 (6): 44–66. <https://doi.org/10.1177/0263276411417444>.
- Linnemann Bech, Morten, and Rodney Garratt. 2017. "Central Bank Cryptocurrencies." *BIS Quarterly Review* September.
- Lodge, Martin, and Andrea Mennicken. 2017. "The Importance of Regulation of and by Algorithm." In *Algorithmic Regulation*, 2–6. London: CARR – Centre of analysis of risk and regulation, London School of Economics and Political Science.

- Madise, Ülle, and Tarvi Martens. 2006. "E-Voting in Estonia 2005. The First Practice of Country-Wide Binding Internet Voting in the World." In *Electronic Voting*. e-voting.cc.
- Manns, Jeffrey. 2009. "Rating Risk after the Subprime Mortgage Crisis: A User Fee Approach for Rating Agency Accountability." *North Carolina Law Review* 87: 1011–1090.
- Matacic, Catherine. 2018. "Are Algorithms Good Judges?" *Science* 359 (6373): 263.
- Meaning, Jack, Ben Dyson, James Barker, and Emily Clayton. 2018. "Broadening Narrow Money: Monetary Policy with a Central Bank Digital Currency." 724. Staff Working Paper.
- Mikhaylov, Slava Jankin, Marc Esteve, and Averill Campion. 2018. "Artificial Intelligence for the Public Sector: Opportunities and Challenges of Cross-Sector Collaboration." *Philosophical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 376 (2128).
- Minsky, Hyman P. 1986. *Stabilizing an Unstable Economy*. Yale University Press.
- Minsky, Hyman P. 1992. "The Financial Instability Hypothesis." In *Handbook of Radical Political Economy*. Prepared for Handbook of Radical Political Economy, Edited by Philip Arestis and Malcolm Sawyer, Edward Elgar: Aldershot, 1993.
- Mitrou, Lilian, Dimitris Gritzalis, and Sokratis Katsikas. 2002. "Revisiting Legal and Regulatory Requirements for Secure E-Voting." In *Security in the Information Society*. IFIP Advances in Information and Communication Technology. https://doi.org/https://doi.org/10.1007/978-0-387-35586-3_37.
- Morris, Anne. 2007. "E-Literacy and the Grey Digital Divide: A Review with Recommendations." *Journal of Information Literacy* 1 (3): 13–28.
- Nikolopoulou, Kleopatra, and Vasilis Gialamas. 2016. "Exploring Secondary School Pupils' ICT Engagement: A Validation Study." *Scientific Research* 7 (4): 567–573.
- Norges Bank. 2018. "Central Bank Digital Currencies." *Norges Bank Papers* 1.
- Olhede, S. C., and P. J. Wolfe. 2018. "The Growing Ubiquity of Algorithms in Society: Implications, Impacts and Innovations." *Philosophical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 376 (2128): 1–16.
- Olhede, Sofia, and Patrick Wolfe. 2017. "When Algorithms Go Wrong, Who Is Liable?" *Royal Statistical Society* 14 (6): 8–9.
- OSCE/ODIHR. 2011. "Election Assessment Mission Report on the 6 March 2011 Parliamentary Elections in Estonia." <http://www.osce.org/odihr/77557?download=true>.

- Overton, Willis F. ed. 2013. *Reasoning, Necessity, and Logic: Developmental Perspectives*. Psychology Press.
- Perez, Carlota. 2009. "The Double Bubble at the Turn of the Century: Technological Roots and Structural Implications." *Cambridge Journal of Economics* 33 (4 SPEC. ISS.): 779–805. <https://doi.org/10.1093/cje/bep028>.
- Petitionsstelle des Deutschen Bundestages. 2015. "Petitionen: Petitionen in Der Mitzeichnungsfrist (Petitions: Petitions in the Timely Limit)." Website Des Deutschen Bundestages. 2015. [https://epetitionen.bundestag.de/epet/petuebersicht/mz.???\\$.SSI.true.page.3.bat chsize.10.html#pagerbottom](https://epetitionen.bundestag.de/epet/petuebersicht/mz.???$.SSI.true.page.3.bat chsize.10.html#pagerbottom).
- Power, Michael. 2004. *The Risk Management of Everything: Rethinking the Politics of Uncertainty*. Demos.
- Pozsar, Zoltan, Tobias Adrian, Adam Ashcraft, and Hayley Boesky. 2010. "Shadow Banking," no. 458. <http://hdl.handle.net/10419/60904>.
- Quinn, John A., Marguerite M. Nyhan, Celia Navarro, Davide Coluccia, Lars Bromley, and Miguel Luengo-Oroz. 2018. "Humanitarian Applications of Machine Learning with Remote-Sensing Data: Review and Case Study in Refugee Settlement Mapping." *Philosophical Transactions of the Royal Society A Mathematical, Physical and Engineering Sciences* 376 (2128).
- R3. 2018. "R3." Website of R3. 2018. <https://www.r3.com/>.
- Rae, Douglas W., and Hans Daudt. 1976. "The Ostrogorski Paradox: A Peculiarity of Compound Majority Decision." *European Journal of Political Research* 4 (4).
- Raskin, Max, and David Yermack. 2016. "Digital Currencies, Decentralized Ledgers, and the Future of Central Banking." 22238. *NBER Working Paper No. 22238*. NBER Working Paper.
- Robinson, Katherine Morton. 2001. "Unsolicited Narratives from the Internet: A Rich Source of Qualitative Data." *Qualitative Health Research* 11 (5): 706–714.
- Robleh, Ali, John Barrdear, Roger Clews, and James Southgate. 2014a. "The Economics of Digital Currencies." *Bank of England Quarterly Bulletin* Q3: 1–11.
- Robleh, Ali, John Barrdear, Roger Clews, James Southgate, Robleh Ali, John Barrdear, Roger Clews, and James Southgate. 2014b. "Innovations in Payment Technologies and the Emergence of Digital Currencies." *Bank of England Quarterly Bulletin* Q3: 262–276.
- Rothstein, H., M. Huber, and G Gaskell. 2006. "A Theory of Risk Colonization: The Spiralling Regulatory Logics of Societal and Institutional Risk." *Economy and Society* 35 (1): 91–112.

- Samek, Wojciech, Thomas Wiegand, and Klaus-Robert Müller. 2017. "Explainable Artificial Intelligence: Understanding, Visualizing and Interpreting Deep Learning Models." *Artificial Intelligence*.
- Schinasi, Garry J. 2004. "Defining Financial Stability." *IMF Working Paper* WP/04 (187).
- Schroeder, Susan. 2013. "A Template for a Public Rating Agency." *Journal of Economic Issues* 47 (2): 343–350.
- Schwarcz, Steven L. 2002. "Private Ordering of Public Markets: The Rating Agency Paradox." *University of Illinois Law Review* 1.
- Schwarzer, S., and C. Wallner. 2009. "Don't Jump over Acceptability before Implementing E-Voting. Social Acceptability and Its Conditions of e-Participation." *EDEM 2009 – Conference on Electronic Democracy 2009 Prosser*, 265–272.
- Singh, Manmohan, and Zoltan Pozsar. 2011. "The Nonbank-Bank Nexus and the Shadow Banking System." *IMF Working Papers* 11: 1. <https://doi.org/10.5089/9781463927233.001>.
- Skreta, Vasiliki, and Laura Veldkamp. 2009. "Ratings Shopping and Asset Complexity: A Theory of Ratings Inflation." *Journal of Monetary Economics* 56 (5): 696–699. <https://doi.org/10.1016/j.jmoneco.2009.05.001>.
- Smith, Linda C., and Melissa A. Wong. 2016. *Reference and Information Services: An Introduction: An Introduction*. Libraries Unlimited.
- Sonntag, Daniel. 2018. "AI in Germany: Well-Prepared and Eager to Do Something." *KI – Künstliche Intelligenz* 32 (2–3): 97–99.
- Stark, Rafael Hernández, Pascual Martínez Ibáñez, and Enrique Montiel Parreno. 2018. "MyShopNET: Personalized Consumer Goods e-Commerce Platform." In *Customization 4.0*.
- Sy, Amadou N R. 2004. "Rating the Rating Agencies: Anticipating Currency Crises or Debt Crises?" *Journal of Banking and Finance* 28 (11): 2845–2867. <https://doi.org/10.1016/j.jbankfin.2004.06.012>.
- Teague, Vanessa, and Roland Wen. 2012. "Problems with the IVote Internet Voting System." *CORE Submission to the Inquiry into the Administration of the 2011 NSW Election and Related Matter* 7.
- Thiel, Sandra van. 2014. *Research Methods in Public Administration and Public Management*. London: Routledge.
- Treleven, Philip. 2015. "Financial Regulation of FinTech." *Journal of Financial Perspectives* 3 (3). EY Global FS Institute: 114–121.

- USACM. 2017. "Statement on Algorithmic Transparency and Accountability."
- Utzig, S. 2010. "The Financial Crisis and the Regulation Banking Perspective Asian Development Bank Institute." *Social Science Research Network*, no. 188: 1–26. <https://doi.org/10.2139/ssrn.1592834>.
- Veale, Michael, and Reuben Binns. 2017. "Fairer Machine Learning in the Real World: Mitigating Discrimination without Collecting Sensitive Data." *Big Data & Society* 4 (2).
- Vicario, Michela Del, Alessandro Bessi, Fabiana Zollo, Fabio Petroni, Antonio Scala, Guido Caldarelli, H. Eugene Stanley, and Walter Quattrociocchi. 2016. "The Spreading of Misinformation Online." *Proceedings of the National Academy of Sciences of the United States of America* 113 (3): 554–559.
- Walshe, K., and D Phipps. 2013. "Developing a Strategic Framework to Guide the Care Quality Commission's Programme of Evaluation."
- Wang, May. 2016. "The Impact of Personalization and Compatibility with Past Experience on E-Banking Usage." *International Journal of Bank Marketing* 35 (1): 45–55.
- Ward, Andrew C. 2009. "The Role of Causal Criteria in Causal Inferences: Bradford Hill's 'Aspects of Association'." *Epidemiologic Perspectives & Innovations: EP+I* 6: 2.
- Webster, Jane, and Richard T. Watson. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review." *MIS Quarterly* 26 (2): xiii–xxiii.
- White, Lawrence J. 2009. "The Credit-Rating Agencies and the Subprime Debacle." *Critical Review: A Journal of Politics and Society* 21 (2–3): 389–399. <https://doi.org/10.1080/08913810902974964>.
- Ziewitz, Malte. 2016. "Governing Algorithms – Myth, Mess, and Methods." *Science, Technology, & Human Values* 41 (1): 3–16.

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Abstract

Systemic Stability and Algorithm-Based Policy Interventions

The velocity of the change that every particular system endures makes the adaptation of ICT-based regulations harder but also more efficient in comparison with their non-technologically based counterparts. If states and regulators wish to keep up with social and economic changes, triggered by technological development, it is imperative that advanced technologically based tools of public intervention are developed. This dissertation analyses how and under which conditions algorithms can be employed for a more target-oriented and efficient form of public intervention than non-technical solutions. The articles of this dissertation examine three cases in which algorithms can provide potentially more efficient and effective solutions than non-technological public interventions. The first paper analyses the market for credit ratings agencies and discusses a technologically based platform that aims to make the market more efficient. The introduced system removes the direct link between the issuers and the rating agencies, it randomises the contracting process and introduces a standardised pricing system in order to free the players from their individual conflicts of interest. The second paper analyses how digital currencies might increase the potential of central bank intervention by allowing for geographically and sectoral targeted credit creation. The third paper discusses the future of voting. Elections are essential for the future of the state and the paper proposes a continuous internet-based election process that allows for permanent voting, without destabilising the system. The system also allows negative votes, which results in a very interactive and responsive system. One of the core objectives of the proposal is to see how the election system might be able to counter political apathy.

Lühikokkuvõte

Süsteemi stabiilsus ja algoritmipõhised poliitikameetmed

Süsteemile mõju avaldavate muutuste tempo teeb tehnoloogiapõhise sekkumise keerukaks, samas on IKT-le põhinevad lahendused tõhusamad kui mitte-tehnoloogilised regulatsioonimehhanismid.

Kui riigid ja regulaatorid soovivad sammu pidada tehnoloogia arenguga kaasevate ühiskondlike ja majanduslike muutustega, on mõõdapääsmatu, et tuleb töötada välja uuenduslikke tehnoloogiapõhiseid riigipoolse sekkumise meetodeid.

Väitekirja analüüsibki, kuidas ja millistel tingimustel võiks algoritme rakendav riigipoolne sekkumine olla eesmärgipärasem ja tõhusam kui mitte-tehnoloogiapõhised lahendused. Käesoleva doktoritöö raames esitatud artiklid käsitlevad kolme juhtumit, kus algoritmide rakendamine võiks pakkuda suuremat tõhusust ja toimetõhu kui selline riigi sekkumine, mis tehnoloogilisi võimalusi ei kasuta.

Esimene artikkel analüüsib krediidireitingu agentuuride turgu ja käsitleb tehnoloogiaplatvormi, mille eesmärgiks on turu toimimise tõhustamine. Väljapakutud rakendus kõrvaldaks otsese seose emitentide ja reitinguagentuuride vahel, randomiseeriks teenusepakkuja valikut ning võtaks kasutusele standardiseeritud hinnakujundusmeetodika, et vabastada osalejad võimalikust huvide konfliktist.

Teises artiklis analüüsitakse, kuidas digitaalvaluutat võiksid tõsta keskpanga sekkumise tõhusust võimaldades geograafiliselt ja valdkonnapõhiselt suunatud krediidiloomet.

Kolmandas artiklis on vaatluse all valimiste tulevik. Valmised on riigi tuleviku seisukohast võtmetähtsusega ja käesolev uurimistöö pakub välja pideva internetipõhise valimisprotsessi, mis võimaldab püsivalt hääletamist ilma süsteemi destabiliseerimata. Kirjeldatav süsteem võimaldaks ka negatiivset hääletamist, mis muudaks selle süsteemi iseäranis interaktiivseks ja vastusvõimeliseks. Pakutud lahenduse üks põhieesmärke on näha, kuidas valimissüsteemi kaudu oleks võimalik saada jagu poliitilisest apaatiast.

Publications (Articles I-III)

Article I

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The European rating fund

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Abstract

Purpose – The complexity of the financial markets and their controlling entities make structural reforms highly problematic and controversial. This paper aims to address the deficiencies of the credit rating agency (CRA) market. The contribution of this paper to this long and ongoing discussion is a reform concept that is based on the introduction of a new public entity.

Design/methodology/approach – The design is based on the market deficiencies and structural issues defined by numerous other researchers.

Findings – The proposed market reform is based on the introduction of an entity that mainly acts as a communication layer which takes over the contract distribution and payment organization between the issuers and the agencies. The distribution of products for ratings gets anonymized and randomized, which eliminates most conflicts of interest that prevent the market players from performing as they should. This process changes the market fundamentally, but it does not impact either side's capacity to make profit.

Research limitations/implications – The concept can hence solve most issues of the market, but not all.

Practical implications – The concept is a first step toward necessary reform, and this paper fuels a new discussion about a valid CRA market reform. The reform proposal mentioned in this paper focuses on the European Union, but the structure is easily adaptable to other markets.

Originality/value – The structure introduced in this paper is a new concept that has not been proposed before.

Keywords Credit ratings, Financial regulation, Credit rating agency, Financial institutions, Financial market, Financial reform

Paper type Conceptual paper

1. Introduction

The market for credit ratings is a highly controversial topic. Numerous problems with conflicting interests and unsatisfactory performances are documented. Thorough reforms of the markets have not really been implemented. Moreover, most of the solutions proposed in the academic debate have flaws, as these do not sufficiently address some of the crucial conflicts of interest that pester this market.

This paper proposes a new distribution and administration system for the rating agency market. The model focuses on the European Union (EU) but it is easily adaptable to other parts of the world as well. The European Rating Fund (ERF) is a simply designed communication and distribution platform that eliminates the rating agencies' conflicts of interest. The objective of the ERF is to enable the rating agencies to perform more accurately in regard to financial market risk assessment.

This paper introduces the ERF as one possible design for a completely new supervisory entity that provides a protective layer for the rating agencies and a payment pool for the issuers, without creating high costs or time-consuming bureaucracy. The ERF mediates between companies issuing financial market products and rating agencies. It uses a



randomized contract distribution as well as a payment and communication system that eliminates the conflicts created by the current structure without impacting the independence and profitability of either side of the market. Market failures deriving from oligopolistic structures, gaming behavior, moral hazard as well as conflicts of interest will all be eliminated by this new regulatory entity. This enables the credit rating agencies (CRAs) to report more accurate results.

Protection from these conflicting interests is the core reason for creating the ERF. The ERF is a public entity that intermediates all communication, regarding ratings, between the CRAs and all issuing companies. Within the ERF, a randomized matching process takes over the contractual agreements between the particular CRA and the issuing entity. The ERF can be pictured as a layer in between the two markets. Its introduction requires a few legal changes in the market, as contracts are no longer made directly between the companies but via the ERF instead. A rating that has not been distributed by the ERF would be accepted as valuable.

Within the EU the ERF can be created as a sub-entity supervised by the Single Supervisory Mechanism, but many different arrangements are also possible. Some will be exemplified within this paper.

2. The credit rating market

The European CRA market is dominated by three players: Standard and Poor's group, with 40.42 per cent market share in 2014; Moody's group with 34.67 per cent market share; and Fitch group with 16.8 per cent market share. The strongest competitor within the EU is DBRS Ratings Limited with 1.47 per cent market share in 2014, which is also the only company that is allowed and able to provide all rating services (ESMA, 2015). There are countless studies on the CRA market and its problems. The core of these problems includes the three issues of market composition, the payment structure and the market failures.

The underperformance of the CRAs and the systemic problems has repeatedly attracted attention in times of crisis (Kuhner, 2001). The last time their performance provoked broad criticism was the Enron crisis and the subprime crisis (Hill, 2002, 2010; White, 2009). These crises also emphasized the controversial performance of the CRAs in warning the markets of possible threats or excessive risk exposures (Dennis, 2008; Notermans, 2013; Sy, 2004). The CRAs have proven inefficient at reporting and warning in more than these two cases (Dennis, 2008; Skreta and Veldkamp, 2009; Véron, 2011).

The CRAs are supposed to supply the market with information about the risk, the stability and the reliability of particular products or institutions. In our economy, there is no perfect stream of information, which makes it necessary to hand the investors the ability to obtain realistic information on the risk of a product. The issue of incomplete information also makes it obvious that the CRAs are not able to perform without errors, as they are only trying to develop probabilities. Thus, some credit rating errors have to be accepted.

It can generally be said that a special interest toward the CRAs, as they are private entities, comes from the public role they are playing as deputies. Deputies in this case mean that private companies are entitled by law to occupy a public role. The problem with such agents is that most states struggle to hold such entities accountable for their performance, which is also the case in the CRA market. A certain level of accountability for their risk assessments would give not only the states but also other market players a certain level of leverage to engage the entities and would hence incentivize them to improve their performance (Manns, 2009; Schwarcz, 2002).

Another important issue with this market is the basic economic theorem of moral hazard and the more general conflict of interest (Kao, 2012; Kalinowski, 2012).

Another issue is that the clients of the CRAs and thus the issuers of the products have the opportunity to just move to another agency for a rating, which incentivizes the agencies to give optimistic ratings regardless of the situation in the markets (Diomande *et al.*, 2009). Reputational considerations, such as the classical theory of the “reputational-capital”, have to be put aside at this point, as empirical facts prove them wrong. The reputational incentive deriving from the investors is simply weaker than the incentive to make profit and to please their direct customers (Dennis, 2008). Reputation also has a major impact on the success of the hypothetical market entry of an honest rating agency into a market with mostly inflated ratings. If the reputation is mainly based on sophisticated investors, a cyclical reputation is predicted and it acts as a saddle point for a market in which trusting investors are the dominant force. In case of trust, the new honest CRA requires no long-term support from a regulatory side to be successful, which is not the case if sophisticated investors are predominant for the reputation of CRAs (Hirth, 2014).

The sharing of models and information has a direct connection to another fundamental problem of the current CRA market structure. The issue has been named “the burden of proof”. This burden lies currently with the agencies, which means that each CRA has to be able to understand the inner working processes that determine the effects of a product. These are supposed to predict its behavior in every possible scenario. For simple products, this is certainly not a problem, but for modern and advanced products, this can be very challenging. A former Standard and Poor’s chief credit officer for structured finance admitted that the model used for mortgage-backed securities in 2005 and 2006 was only a little more accurate than a coin flip (Jacobides, 2014). So, the issuer needs to provide sufficient information and transparency on the products to enable a reliable rating. The switch of the burden of proof means that the constructing entities have to be obliged to provide all information that the CRAs require so that they are able to understand the inner workings of such products (Kalinowski, 2012). This step provides a crucial advancement, as it is documented that some algorithms within the market, high-frequency or not, are not sufficiently understood, by the CRAs and sometimes even by the issuing entity, to measure their performance even in times of usual service, less in times of crisis (MacKenzie, 2014).

Yet another issue is that the issuers can pressurize the CRAs for higher ratings and threaten to move to the competition, while the CRAs are incentivized to accept higher ratings for not as solid products to fulfill their customers’ interest. The CRAs are thus struggling to rate with accuracy.

A part of that issue is the tendency of herding behavior in the CRA market, which means that if one agency downgrades a product, the probability that another agency will downgrade the same product increases (Güttler and Wahrenburg, 2007). This might sound like a contradiction of the last paragraph, but it is not, as the market and issuers’ situations for the particular cases are different.

The EU reacted to these issues after the subprime crisis. The European Securities and Markets Authority (ESMA) has taken on the difficult task of increasing the accountability of the CRAs within Europe. This supervision entity covers one important part of the supervision of the performance of the CRAs, but the incentive systems for the CRAs remain mostly the same.

Also internationally, some changes were triggered. The Basel Committee on Banking Supervision that supported and built the CRA’s influence with the Basel I Agreement from 1988 and cemented the fundamental role for the ratings and the CRAs in the agreement popularly called Basel II (BCBS, 1998, 2006) distanced itself from the too important roles of the CRAs in a report on credit risk estimation from 2015. The entire publication offers no solution for the problem of the weak performance of the CRAs; while the dependence on

these entities remains, it shows a shift in perspective (BCBS, 2015). The agreements also furthered the view that the bank itself can be seen as its first control entity, as it has to fulfill the equity and liquidity requirements (BCBS, 2011). This means that the CRAs are losing a little bit of their influence, but as most of the risk estimation is still based on their calculations, they are not really threatened. Further alternative rating mechanisms will be introduced for a further improvement of the system (BCBS, 2015).

The Dodd–Frank Act requires the regulators in the USA, above all the Securities and Exchange Commission and the Federal Reserve, to reduce the references to ratings of all sorts in their rules for banks (Acharya *et al.*, 2011). Still, all reforms are still criticized as insufficient and unfocused on the conflicts of interest (White, 2010; Opp *et al.*, 2013).

Regulation can worsen a crisis if the already struggling financial market players are obliged to increase their equity base overproportionally when the ratings are falling, which means that prices are dropping and the market players are already losing money. This forces them to reorder their portfolio and react to the changed situation. At the same time, they need to increase their equity bases to comply with the regulation, as the ratings for the products are dropping. In the end, this is a self-enforcing cycle of more needed equity and less tolerance for risk, which drives the involved entities deeper and deeper into trouble. This vicious cycle can prevent banks from lending and can thus transmit troubles from the financial markets to the rest of the economy (Loannidou, 2012; Mizen, 2008).

The CRAs are thus indirectly holding a position of systemic importance, which is problematic if we go back to the payment structure and especially if the numerous results indicating controversial influences of regulations are taken into account. It is not questioned anymore that the optimality of regulation depends on the market situation (Harris *et al.*, 2015; Loannidou, 2012). In particular for the CRAs, it has shown that small changes in the regulatory treatment of highly rated securities may result in large shifts in the rating standards (Opp *et al.*, 2013).

3. Solution attempts

Most experts in the field nowadays see the CRAs through critical eyes. So does the Basel Committee, which issued a consultative document in March 2015 that reads: “In revising the treatment of bank exposures, the Committee aims to remove both references to external credit ratings and the link to a sovereign’s credit risk” (BCBS, 2015, p. 5). The Committee aims to introduce measures to limit the importance of the CRAs for banks. The current proposal of the Basel Committee would lead to an increased self-control of the banks, which underlies their own strong incentive of survival. This first alternative solution proposal thus aims to replace the influence of the CRAs with self-controlling power for the banks. The problem with this proposal is that the incentive systems for the management and key employees are mostly short-term-oriented, as most contracts are set out for only a few years, often not more than two, and the individual performance is measured in turnover or profit. This means that for these entities the importance of long-term and sustainable decisions has to be secondary. The bottom line is that the systemic changes should be implemented and the deputies or public entities should control the markets and represent the interests of the society. This is important as the company’s interest as well as the market’s interest is represented within the firm, but the interests of the society and other markets are missing. If one of these interests, companies’ self-interest, market interest and public interest, is not represented within a systemic relevant market, then it will lead to stability problems in the long run. The argument that competition will place the general interest first cannot be applied to this particular case as the self-controlling mechanism under the current market

structure would trigger a race-to-the-bottom situation in which all involved entities would promote their products as much as possible with the least amount of control possible.

Reform proposals, like alternative payment structures with a supervised user-fee approach, have been proposed and would actually solve the intrinsic problem of the agencies. This second proposal is built on a competitive auction process which is an adaptation of the old subscription process. The CRAs would have to put their products out for bidding. All interested buyers would then be able to bid for each product. The approach is supposed to contain the costs of the ratings, widen the competition among the CRAs, facilitate the entrance of new companies and evaluate the attractiveness of market-based assessments. The bidding would be controlled by a public entity, which should ensure the smooth development of the process. The problem is that this approach does not solve the gaming behavioral problems that are challenging the market (Manns, 2009). The entrance of new companies is shown to have a positive effect on the rating standards and quality (Doherty *et al.*, 2012). The proposal binds the CRAs to the investors seeking information as clients and the issue of reputation would gain importance again, but it has to be assumed that the described movement from one CRA to another in search of the best rating would not be eliminated. This would put the rating agencies under the same pressure they are currently in, as the factor of herding behavior would also regain importance.

Going back to the original subscription-based payment model is not possible anymore because of the technological development and thus the broad availability of the ratings. The user-fee approach circumvents this problem as the winners and thus receivers of ratings are a limited and easily determined group of entities or people. In 2014, there were 26 CRAs allowed to perform particular forms of ratings, but, as mentioned, there are only four companies that are allowed and able to rate all possible services (ESMA, 2015). Nevertheless, it has to be mentioned that this market composition is a product of multiple aspects, and some of the most important factors are the natural entrance barriers to the market, such as the reputational concern about small and insufficiently tested companies and the need for highly skilled staff as well as complex and various rating models. Quality standards have to be provided and proven for a successful market entry of a new CRA. This process is problematic, as CRAs, to get certified for a certain product, need to prove that they are credible, and for that they need contracts, for which they again need the certification. Small or new-coming CRAs hence need the leap of faith of a bigger player to enter a market for another product. The growth is hence hard and slow for newcomers. Many of such cases are documented, such as the Chinese Dagong or the German Scope (ESMA, 2015; Hock, 2015; Reuters, 2015).

Another proposal is the creation of public rating agencies. These entities are supposed to rate the ratings of private agencies and start their activity by researching the market before starting to rate themselves. On the one hand, the creation of a public rating agency is an attempt to ensure the performance of the entire system. It ought to provide the three big CRAs with a real competitor that is accepted by the market. The public CRA could prevent any herding tendency because of its public backing and thus independence from the market. On the other hand, the proposal of a public CRA can lead to a new situation of moral hazard, in regard to national political interest. To keep these interests from dominating such an entity, it would be necessary to develop it independently. Within the EU the creation of a European rating agency has been discussed intensively, but such an entity would most probably never gain credibility in regard to sovereign ratings, especially not in times of crisis. A public rating agency tackles some problems, but it does not resolve the basic

conflicts arising from the market structure (Eijffinger, 2012; Schroeder, 2013). Even if the public rating agency could be created in a completely independent fashion, it would not enable the approach to free the market of its profound conflict of interest and thus market failures.

Some even more controversial proposals delegate the ratings to the ECB directly or plan to nationalize the CRAs. Delegating the ratings to the ECB is intrinsically flawed, as this would lead to a direct conflict of interest within the ECB, as the adequate measures in monetary policy can be in opposition to the adequate measures for the financial markets.

Nationalizing the CRAs is particularly controversial and most of the time even is seen as completely unrealistic, as it would not solve enough issues to provide a valid argument for such an aggressive intervention (Eijffinger, 2012). The public agencies would underlie the same trust issues as the public agency described in the paragraph above.

A fourth and less known proposal is the idea of putting the CRAs under pressure by a “Credit Research Initiative”, which is supposedly an independently financed entity that provides ratings as a public good. The logic is that such an entity providing universally available ratings sooner or later forces the “for profit” CRAs to increase their performance or search for their niche service within the market. The highly demanding project is developing, but it is still a long way from the objective (Duan and Van Laere, 2012). The problem with the system is that the credibility is not necessarily given, and the project might only gain traction after another crisis in which the ratings of these agencies would be more precise than the ratings of the current CRAs. The second issue with this proposal is that its independence needs to be questioned as the project requires a lot of funding, and some of the sources of this funding might have their own interests.

A very promising solution for the issuer-pays problem is the “Cuomo plan”, a proposal in which the issuer pays half the payment up front, and the rest gets paid only if the rating proves to hold up with the ratings of other CRAs on the same product, or with the default and volatility expectations of the product until maturity (Bolton *et al.*, 2012). An issue with this approach is that the issuers are still able to select between the CRAs, and the gaming behavior is hence not eliminated.

The last alternatives, which are the closest to the design of the ERF, were introduced by Welfens (2010) and the US Government Accountability Office (GAO, 2010). According to Welfens’s proposal, all issuers are supposed to pay into a pool, which then finances the rating itself and distributes it with the help of the competitive tenders. The GAO proposed a clearinghouse system that uses a random sample distribution of contracts. On the basis of this idea, a promising auction model was proposed (Bartels, 2015). The ERF follows an alternative approach while using the randomized clearinghouse platform, and uses different distribution mechanisms and randomization standards and also introduces an accountability for the CRAs.

4. The European rating fund

The basic idea of this new entity is that the ERF is a distribution layer between the CRAs and the issuer. All products that are to be rated are matched with a randomized process within the ERF to a CRA. This step eliminates all problems deriving from the current payment system. In addition, the gaming behavior for issuers of switching between the CRAs is minimized, as it cannot be ensured that another CRA will receive the product in the second attempt. On the other hand, this system eliminates the incentive for the CRAs to provide overoptimistic ratings, as the issuer is not able to switch the provider because the rating distribution is randomized.

In detail, the creation of this entity would, under the design presented here, mean that a one-time public investment would be necessary to create the ERF. The missing funds could be provided by the issuing parties. A small percentage, not more than 1 per cent, of the costs for a rating could be kept with the new public entity to finance the ongoing costs, the court and the updating of the system. The price for one rating, with regard to its volume and complexity, could be determined in an yearly updated agreement between the representatives of the CRAs and the issuers with a supervision from the ERF. This step would mean that the price would become insensitive to market pressures.

The changes to the payment system are important for the success of the ERF, but equally important is its distributive function. The detailed distribution process of the ERF could look like the following. The issuing entities send the application for all new products for which ratings are wanted as well as all the necessary information to the ERF. The CRAs on the other hand send the number of ratings they would like to claim to the ERF. The administration of the ERF then runs a randomized matching process that distributes the products to one of the agencies. This randomized process does not mean that the development of the company becomes a gamble, it rather follows clear lines. This will be explained later on.

This cuts the direct contact between the issuers and the agencies and thus eliminates the gaming incentive for both sides. The opinion of the issuer is no longer relevant to the CRAs, as the contract is not made between the agencies and the issuing company, and, respectively, the ERF and the CRAs do not need the approval of the issuing entity to receive further contracts. This fact cannot be stressed enough as it is in complete contrast to the current system. The number of contracts an agency receives is not impacted by the impressions or preferences of the issuer. The agencies have the ability to improve their probability of receiving a certain number of ratings, but do not have the chance to influence the products they get. The impact factors on the number of claims used in this example will be explained in more detail further on. The impact factors are good performance, adequate response time and the number of claims the particular CRA reports to the ERF. A formula with these or similar incentives can be designed in many ways, and it is really not important how it looks as long as it fulfills the crucial requirements of incentivizing high-quality performance.

Another way to exemplify such distribution influences could be that all sellers of products with ratings receive an automated formula, as most trades are electronic anyway, which gives them the opportunity to rate the trust they have in a particular rating on the product they are selling. These points could then be compared to industry averages, and companies with higher points in one kind of product would receive more ratings of this kind than other companies. Professional traders could receive time-saving variants of such enquiries. Another way could be to test the products issued by the ERF so that most comparative results would be received.

Yet another important aspect for the ERF is the settlement of disputes between the CRAs and the issuers. For example, in a case where any information is missing, the CRA is supposed to claim such information indirectly from the issuing entity through the ERF. This standardized process could be organized in the form of an anonymized email distributor. The process can be completely automatized, which would enable a transmission within milliseconds and would thus not take a very long time. Another way to organize this claim for more information would be an online form that the rating specialist completes and which is transmitted over a platform of the ERF to the responsible issuer. Many other technical solutions are possible, but elaborating all of them is not the purpose of this paper. If the issuer is not willing or able to provide more information, it will be denied further data. The CRA can then decide if a rating is possible without the additional data. The CRA can deny the rating if it

is not possible, and the ERF will inform the issuer. If the issuer insists on receiving a rating, the ERF will send the product to another agency. The claim will then be tested by the other CRA, and if this agency also reviews the provided information as insufficiently transparent, the product will receive the rating grade of being insufficiently transparent. An additional upside deriving from this step is the limiting of unnecessary complicated products, as the CRA cannot just rate them in a reliable form. It could be a T instead of AAA, but this design question can be left up to the ingenuity of the CRAs themselves.

The ERF is also a basis for juridical disputes in court in case of charges against an agency and should be heard, as its position enables its employees to have detailed insight into the market and its development. The court must consist of a group of experts that will need fixed appointments there and a contractual obligation to never take a position in a private company in the financial market again. All these are done to ensure independence and prevent a revolving-door effect for the court. Such a system of charges can only work if the burden of proof is shifted toward the issuing entity. The responsibility for the CRAs in this case is that they need to be able to prove in cases of question that they actually used the necessary information for each rating. If in particular cases, the CRAs are only able to close in heuristically on the results regarding the performance of a product during different market situations, then they are not to be made reliable for their rating. The CRAs need to be able to fully understand a product to rate it. This step gives the CRAs a more profound insight, but it does not solve the accuracy of ratings in general as the macro influence factors are not considered here.

5. One exemplified composition of the ERF

Up to this point the approach was explained more or less generally. The following section is an example of a process that can be created in many different forms, and method presented here is the first idea of how to organize a distribution process. Q_{gen} is the general quota of the number of applications for products that need a rating minus the claims for products of all agencies.

$$Q_{gen} = \sum n_{applications} - \sum n_{claims} \quad (1)$$

One could say that $Q_{gen} = Supply - Demand$.

Hence:

If $Q_{gen} > 0$ = Matching of all ratings in accordance with Step 2 and transmission of all not allocated ratings to the next day;

If $Q_{gen} = 0$ = Matching of all ratings in accordance with Step 2;

If $Q_{gen} < 0$ = Distribution of the real quota through Formula (2) and matching of all ratings in accordance with Step 2;

s = agency;

x = number of cases of liabilities – number of penalties from investors, issuers or the ERF (need to be accepted by the ERF) – erased after two years without new claims;

n = number of years;

y = number of ratings published too fast or too slow – erased after two years without new problems;

c = number of claims of the agency; and

$ind\emptyset$ = industry average – industry here means here all agencies certified and active within one group of products.

The second formula comes only into place if the first step has resulted in $Q_{gen} < 0$.

$$c_{s_{real}} = c_s - \left(\frac{\sum (x_{s_1}^2 + \sqrt[2]{x_{s_2}^2} + \sqrt[n]{x_{s_n}^2})}{x_{ind\emptyset}} - 1 \right) - \left(\frac{\sum (y_{s_1}^2 + \sqrt[2]{y_{s_2}^2} + \sqrt[n]{y_{s_n}^2})}{y_{ind\emptyset}} - 1 \right) - \left(\frac{\sqrt[2]{c_2}}{\sqrt[2]{c_{ind\emptyset}}} - 1 \right) \quad (II)$$

The formula used here tries to cover some of the other systemic problems of the CRA market. The main focus of the formula lies on the number of liabilities, and hence the legal cases that the agency lost in the ERF's court because of wrong predictions and the weak performance of a rating. It uses accountability as an impact factor, but this is by no means necessary for every formula with this position and function. The point of this formula is to set the right incentives for the rating agencies. The formula incentivizes against overreporting and for high-quality work, which also sets the very first step toward a new possibility for more reliability on the ratings. A company that performs poorly or hastily can suffer under its own poor performance especially if the poor performance continues over time.

The point of liabilities in the formula is that issuers and investors should receive an opportunity to hold the CRAs accountable. Liabilities can be claimed against CRAs if a rating has not lived up to the claims a particular grade announces. In this case, the issuers and even the clients buying these products are able to charge liabilities against the rating agency. Liabilities can be claimed by investors if they do not believe that the CRA used all necessary, provided information to create the particular rating. The liabilities can be claimed three months after the product receives a new rating grade. This gives the issuer, investors or supervisory entities enough time to evaluate the situation. The CRA needs to explain why the rating in the particular case was a right response to the changes. The liabilities are thus not focused on the actual performance of the rated product, but on the question if the CRA did everything in its power to estimate the risk of a product correctly. This includes company products as well as public products.

To protect the CRAs from a flood of charges on a daily basis, it is important to put in a minimum level from which the CRAs might be made reliable for their misbehavior. Reliability in the case of the CRAs is hard to define and should not be reflected in a strict percentage, as the reliability has to reflect the particular market situation, but it should be expressed in a quantitative as well as in a qualitative and long-term-oriented, averaged form. Each rating grade in each company has a definition. These definitions have to be made or interpreted in a robust enough manner. The definitions have to enable a working system of reliability, while it always remains partially up to the opinion of the court if a liability is charged or dismissed against a CRA. This paper is too short to discuss the possible design of the concrete liability standards, so this has to be left for future research. It is also up to the court to decide if a liability just means an impact on the score of receiving products to rate or if the failure is so severe that actual monetary penalties are enforced.

This system would thus provide a very first step toward the introduction of a limited responsibility for the quality of their work. It gives all issuers and investors the possibility to encourage high-quality performance by claiming liabilities, and it protects the CRAs from unrealistic financial claims. A not well-performing company will receive fewer claims and should be further punishable by the ERF if the performance does not improve. Similar claims about limited rating agency liability have been made by others as well (Dennis, 2008; Bartels and Weder, 2013).

The ability of CRAs to adapt their number of claims to their performance situation is countered by the last term in the formula. Overreporting is detected through the introduction of an industry average that shows by past experience the number of ratings one rating specialist can conduct with sufficient quality on average, in one particular product group per day. No CRA is allowed to surpass the industry average in the number of ratings per rating specialist by more than 5 per cent with their number of claims. This 5 per cent above the average is supposed to enable a profitable quantity for the CRAs and to prevent the rating specialists from overstressed, hasty and unreliable work. The formula works like this, a company that overreports gets penalized for it by receiving fewer claims.

The ERF also introduces systemic changes that are not implied in the system itself. The ERF tries to enable a higher reliability on ratings in any economic situation. Quality ratings are subject to the fact that the issuing entities need to be obliged to inform the rating specialists in detail about the inner workings of their products and disclose their model at length. This means that the burden of proof needs to be shifted to the issuer. Providing access to the rating models in detail would normally have a major impact on the competitiveness of a company, but in this case the models are only disclosed to the members of the ERF court if someone questions the CRA's methods. The court consists of independent experts, who are obliged to complete silence, and the models and core competencies are hence protected from the concurrence.

The other important, not yet mentioned, structural change that fights the problem of the current market composition is that the CRAs have the right to deny a rating. The CRAs possess this right at present, but as they are paid from the issuer, they are trapped. This might lead to incomplete independence. With the ERF, they receive the right to refuse the rating without losing money, as the issuer needs to pay for the rating anyways if sufficient information is not provided. If the second CRA testing the claim that crucial information is missing agrees with the first CRA, the rating for the particular product is denied. Such rating denial results in a temporary reapplication ban for this particular product until all necessary information is provided. These cases of dispute between the issuer and the CRA could be settled by the ERF.

The second step of the distribution process could look like the following: The entire process can be pictured as two long lists. One is the list of the products in need of rating and the other is a list of the accepted claims of the CRA ($c_{s,real}$). The list of products is ordered in accordance to a ratio that consists of volume and complexity. The ratio could be a simple calculation, for example, volume of the product multiplied by the level of complexity. The level of complexity can be a grouping process of five groups. Group 1 is the lowest and least complicated category. This group would contain shares of well-performing companies and other simple products. Group 5 would include highly complex products, such as algorithmic trading products. The product with the highest ratio occupies the highest position.

The prices for the ratings that the CRAs receive for their services are also bound to this ratio, but the basis for each of these calculations should be discussed once a year between the representatives of both sides and the experts from the ERF. This rids all players from products too expensive or too cheap, which would in both cases lead to problems with the incentives for either side.

The products are then sub-sectioned into thirds. This has only the purpose to facilitate and control the market entry of newcomer agencies. The claims of a newcomer in a new rating market are only accounted for the lowest third of the product group after a predefined number of trial ratings in which the performance of the new agency is tested. An already established CRA calculates a rating for the same product at the same time until the ERF decides that the performance of the newcomer is satisfactory. The profits of the rating are

split between the two companies, which incentivizes the ERF to not unnecessarily prolong a testing period. The newcomer is then allowed to rate the products within this spectrum on its own. The agency can also directly apply for the next higher third and the process continues, while the newcomer is already allowed to conduct claims on the lower third on its own. The remaining products and claims get distributed with the help of an automated randomization process. Such processes are hard to design, but modern programming is continuously improving and exemplifying; such a process would not help anyone at this point.

The quality requirements for creating a rating agency have to be highly demanding. The performance of the agency is logically of crucial importance, as only the incentive to high-quality performance can bring the CRAs to innovate and include not only quantitative, mass-standard considerations in their calculations but also situation-based individual considerations. The broad concept of quality work means that a high-class rating grade is not supposed to be something natural, but it has to be earned and reliable. Therefore also the rating agencies have to be reliable, which, as mentioned, is a major natural barrier for the CRA market. Certain minimal standards have to be respected for the companies and their employees. Luckily the ESMA has started to certify agencies for products and market sections, according to the EU regulation number 1060/2009 since the reform of the European regulatory system in 2009 (ESMA, 2016). The process is far from perfect and subjected to underlying conflicts, but it is a good first step that could be coordinated with the ERF. Newcomer agencies that fulfill the required standards get trial runs during which experienced agencies rate the same products to ensure the correctness of the rating and to enable a direct comparison for the results of the newcomer. This facilitates and speeds up the market entry for smaller agencies.

The ERF is not a miraculous tool that has only upsides. The incentive for growth for the CRAs would be limited by the current design, as it is only focused on supporting smaller companies, and the incentives for high-quality work are only negative pressures instead of positive incentives. Whether this is a problem for achieving the objective of these pressures remains a question, but it should be mentioned that up to this point, there is not one incentive for high-quality performance that rewards those who perform on high level directly.

Another crucial aspect of the ERF is the cutting of the direct connection between agencies and financial institutions. The relation has to be minimized to guarantee the efficiency and objectivity of the entire control system. For that reason, the communication between the agencies and the issuing entities is bound to a strictly defined protocol. Ideally, the process would be anonymized as far as possible, as this would minimize the influences of interpersonal relations and thus possible personal conflicts for the involved parties.

The ERF would thus resolve most described intrinsic problems of the market and would make further market developments, such as the introduction of public agencies or advanced performance accountability, easier to implement. The introduction of the ERF would completely change the CRA market and improve the performance of the CRAs without hurting the mobility of the core financial markets. It would thus be one additional stabilizing puzzle piece for the entire financial system.

However, the limitations of the ERF come from several sides of the financial market. One fundamental problem that the structure cannot tackle is an issue with derivatives. Derivatives enjoy bankruptcy privileges, which were implemented to advance the trade with these products. These privileges enabled a wide spread of derivatives and thus an increased contagion during the development of the crisis (Bolton and Oehmke, 2015; Stulz, 2009). The ERF is not able to interfere here, as the bankruptcy privileges keep making derivatives;

destabilizing or not, it is very attractive and thus higher rated. The ERF cannot stop this possible source of contagion.

One more limitation to the objective of the CRA independency is definitely the so-called revolving-door effect, a process that describes that high-level employees change numerous times during their careers between private sector companies and the financial market-supervision entities that are supposed to control their former employer (Lucca *et al.*, 2014). It was shown empirically that the ratings for future employers of a rating specialist who is about to transition to that company have a strong tendency to be inflated. No other significant and robust correlations between the ratings and the analyst's job position were found (Cornaggia *et al.*, 2016). Even though the CRAs are not official supervision entities, it can be presumed through numerous interviews and other sources that these are also subject to this effect (Dennis, 2008; Rügemer, 2012; Taibbi, 2013).

Yet another limitation is the continuous existence of possible organized fraud, which means that either on a personal or on a structural level, fraud and circumvention are still possible, if criminal intention is behind it. This is an unlikely case, but it is possible and should thus be mentioned.

The last limitation of the ERF is the fact that it was not only the CRAs but also the supervising entities and accountants that underestimated the risk deriving from complex products. Such a systemic misinterpretation of risk cannot be solved by the ERF either.

6. Conclusion

The ERF is a simple but efficient adaptation for the market of the rating agencies. Through its unavoidability for the rating agencies, it is able to change the market constellation and eliminate most conflicting effects distorting the current market. The ERF eliminates the problematic payment contradiction of the markets, as the entity intervenes and handles the contractual agreement for every single product itself. The ERF also eliminates the gaming behavior and the effects of the oligopolistic market composition, as both sides' ability to play, in a game-theoretical sense, disappears through the randomization process.

Its efficiency lies within its simple but absolute position between the CRAs and the issuing companies. The analysis has shown that the ERF would be efficient in improving the performance of the CRAs. The ERF is not a bureaucratically demanding and expansive entity, but rather a combination of slim and fast working processes that enables a fast and consistent distribution process. Yet, it is not a tool that claims that all problems associated with the CRA market can be solved solely by introducing the entity. Some additional reforms, such as the shift of the "burden of proof", would be necessary. The ERF and the surrounding reforms also trigger high-quality performance, which fights the herding effect.

Regarding other reform proposals for the CRA market, the ERF is the most efficient one, as the organizational structure is easy and creates no new conflicts. It fights the customization processes within the markets, as communication is reduced to the minimal and can even be anonymized, but that is not a crucial factor of the design. The entity also creates only a minimalistic amount of additional costs for all parties involved. Moreover, the introduction of the ERF would free all entities in the market from distorting impacts without limiting their business freedom. Nevertheless, the ERF is not a miracle tool that solves all problems that lead to the financial market crisis. It should rather be seen as a tool that provides solid solutions for numerous problems of the CRAs. It has to be noted that various issues with the financial markets remain and will keep distorting the CRAs.

This paper invites researchers, financial experts and politicians to start a discussion about a real-world implementation of a distribution platform similar to the one presented in this paper, as the concept presented here is not directly implementable.

As an indicator for those who might oppose the ERF, a structure similar to this one was introduced after the last financial crisis for another sector of the financial markets. Central counterparty clearing houses were introduced to help facilitate the derivatives trade as well as limiting the risk of over-the-counter trades. These structures may have been used for a different side of the financial market, but their service is structurally rather similar to the hereby proposed one and might be seen as a first indication of a good performance for a structure such as the ERF.

Last, as financial regulation is hardly ever a solely continental issue, it should be at least mentioned that the ERF could be designed as a global endeavor. Yet, this probably is just a utopian concept.

References

- Acharya, V.V., Cooley, T.F., Richardson, M.P. and Walter, I. (2011), *Regulating Wall Street: The Dodd-Frank Act and the New Architecture of Global Finance*, Wiley, New York, NY.
- Bartels, B. (2015), *Essays on Credit Rating Agencies and the Assessment of Sovereign Risk*, Johannes Gutenberg-Universität, Mainz.
- Bartels, B. and Weder, B. (2013), "A rating agency for Europe a good idea?", CEPR Discussion Paper No. DP9512.
- BCBS (1998), *Basel Capital Accord: International Convergence of Capital Measurement and Capital Standards*, BCBS, Basel.
- BCBS (2006), *International Convergence of Capital Measurement and Capital Standards*, Basel Committee on Banking Supervision, Basel.
- BCBS (2011), *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems*, Basel Committee on Banking Supervision, Basel.
- BCBS (2015), *Revisions to the Standardised Approach for Credit Risk*, Basel Committee on Banking Supervision, Basel.
- Bolton, P., Freixas, X. and Shapiro, J. (2012), "The credit ratings game", *The Journal of Finance*, Vol. 67 No. 1, pp. 85-111.
- Bolton, P. and Oehmke, M. (2015), "Should derivatives be privileged in bankruptcy?", *Journal of Finance*, Vol. 70 No. 6, pp. 0-51.
- Cornaggia, J., Cornaggia, K.J. and Xia, H. (2016), "Revolving doors on wall street", *Journal of Financial Economics*, Vol. 120 No. 2, pp. 400-419.
- Dennis, K. (2008), "The ratings game: Explaining rating agency failures in the build up to the financial crisis", *University of Miami Law Review*, Vol. 63 No. 1111.
- Diomande, M.A., Heintz, J.S. and Pollin, R.N. (2009), "Why US financial markets need a public credit rating agency", *The Economists' Voice*, Vol. 6 No. 6.
- Doherty, N.A., Kartasheva, A.V. and Phillips, R.D. (2012), "Information effect of entry into credit ratings market: the case of insurers' ratings", *Journal of Financial Economics*, Vol. 106 No. 2, pp. 308-330.
- Duan, J.C. and Van Laere, E. (2012), "A public good approach to credit ratings – from concept to reality", *Journal of Banking & Finance*, Vol. 36 No. 12, pp. 3239-3247.
- Eijffinger, S.C.W. (2012), "Rating agencies: role and influence of their sovereign credit risk assessment in the Eurozone", *Jcms: Journal of Common Market Studies*, Vol. 50 No. 6, pp. 912-921.
- ESMA (2015), "Competition and choice in the credit rating industry: market share calculation required by article 8d of regulation 1060/2009 on credit rating agencies as amended", Paris.

- ESMA (2016), "European securities and markets authority: CRA authorisation", European Securities and Markets Authority, available at: www.esma.europa.eu/supervision/credit-rating-agencies/risk (accessed 7 February 2017).
- GAO (2010), "Report to congressional committees - securities and exchange commission", United States Government Accountability Office.
- Güttler, A. and Wahrenburg, M. (2007), "The adjustment of credit ratings in advance of defaults", *Journal of Banking & Finance*, Vol. 31 No. 3, pp. 751-767.
- Harris, M., Opp, C.C. and Opp, M.M. (2015), "Macroprudential bank capital regulation", Preliminary version.
- Hill, C.A. (2002), "Rating agencies behaving badly: the case of Enron", *Connecticut Law Review*, Vol. 35.
- Hill, C.A. (2010), "Why did rating agencies do such a bad job rating subprime securities?", available at: <http://papers.ssrn.com/abstract=1582539> (accessed 27 April 2015).
- Hirth, S. (2014), "Credit rating dynamics and competition", *Journal of Banking & Finance*, Vol. 49, pp. 100-112.
- Hock, M. (2015), "Hohe Hürden für Newcomer in Europa", *Frankfurter Allgemeine Zeitung*, available at: www.faz.net/aktuell/finanzen/anleihen-zinsen/rating-agenturen-hohe-huerden-fuer-newcomer-in-europa-13365370.html (accessed 17 September 2016).
- Loannidou, V. (2012), "A first step towards a banking union", in Beck, T. (Ed.), *Banking Union for Europe – Risks and Challenges*, Center of Economic Policy Research, London, pp. 85-95.
- Jacobides, M.G. (2014), "What drove the financial crisis? Structuring our historical understanding of a predictable evolutionary disaster", *Business History*, Vol. 2 No. 5.
- Kalinowski, W. (2012), *Shadow Banking and the Moral Hazard: Principles for Reducing Model-Based Opacity in Securities Finance*, Institute Veblen, Paris.
- Kao, E.S. (2012), "Moral hazard during the savings and loan crisis and the financial crisis of 2008-09: implications for reform and the regulation of systemic risk through disincentive structures to manage firm size and interconnectedness", *NYU Annual Survey of American Law*, Vol. 67, pp. 817-860.
- Kuhner, C. (2001), "Financial rating agencies: Are they credible? Insights into the reporting incentives of rating agencies in times of enhanced systemic risk", *Schmalenbach Business Review*, Vol. 53 No. 1, pp. 2-26.
- Lucca, D., Seru, A. and Trebbi, F. (2014), "The revolving door and worker flows in banking regulation", *Journal of Monetary Economics*, Vol. 678.
- MacKenzie, D. (2014), "A sociology of algorithms: high-frequency trading and the shaping of markets".
- Manns, J. (2009), "Rating risk after the subprime mortgage crisis: a user fee approach for rating agency accountability", *North Carolina Law Review*, Vol. 87, pp. 1011-1090.
- Mizen, P. (2008), "The credit crunch of 2007-2008: a discussion of the background, market reactions, and policy responses", *Federal Reserve Bank of St. Louis Review*, Vol. 90 No. 5, pp. 531-567.
- Notermans, T. (2013), "Reforming finance; a literature review", *FESSUD, Financialisation, Economy, Society and Sustainable Development*, Vol. 8, pp. 1-91, available at: <http://ideas.repec.org/p/fes/wpaper/wpaper08.html> (accessed 11 November 2014).
- Opp, C.C., Opp, M.M. and Harris, M. (2013), "Rating agencies in the face of regulation", *Journal of Financial Economics*, Vol. 108 No. 1, pp. 46-61.
- Reuters (2015), *Chinese Rating Agency Dagong under EU Probe-Documents*, Reuters, London.
- Rügemer, W. (2012), *Rating Agenturen Einblicke in Die Kapitalmacht Der Gegenwart*, 2nd ed., transcript Verlag, Bielefeld.
- Schroeder, S. (2013), "A template for a public rating agency", *Journal of Economic Issues*, Vol. 47 No. 2, pp. 343-350.

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- Schwarz, S.L. (2002), "Private ordering of public markets: the rating agency paradox", *University of Illinois Law Review*, Vol. 1.
- Skreta, V. and Veldkamp, L. (2009), "Ratings shopping and asset complexity: a theory of ratings inflation", *Journal of Monetary Economics*, Vol. 56 No. 5, pp. 696-699.
- Stulz, R.M. (2009), "Financial derivatives: lessons from the subprime crisis", *The Milken Institute Review (First Quar)*, pp. 58-70.
- Sy, A.N.R. (2004), "Rating the rating agencies: anticipating currency crises or debt crises?", *Journal of Banking and Finance*, Vol. 28 No. 11, pp. 2845-2867.
- Taibbi, M. (2013), "The last mystery of the financial crisis", *Rolling Stone*, available at: www.rollingstone.com/politics/news/the-last-mystery-of-the-financial-crisis-20130619 (accessed 23 September 2015).
- Véron, N. (2011), "What can and cannot be done about rating agencies", *Policy Briefs*, Vol. 21 (November), pp. 1-8.
- Welfens, P.J.J. (2010), "Transatlantic banking crisis: analysis, rating, policy issues", *International Economics and Economic Policy*, Vol. 7 No. 1, pp. 3-48.
- White, L.J. (2009), "The credit-rating agencies and the subprime debacle", *Critical Review: A Journal of Politics and Society*, Vol. 21 Nos 2/3, pp. 389-399.
- White, L.J. (2010), "The credit rating agencies", *Journal of Economic Perspectives*, Vol. 24 No. 2, pp. 211-226.

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Article II

Fischer, Dirk-Hinnerk (2017) "How Tracking of Electronic Money might Improve Financial Market Crisis Intervention", *Management*, Vol: 12 (4): 299–314 (1.2)

How Tracking of Electronic Money might Improve Financial Market Crisis Intervention

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Technology has changed and will continue to change the financial system. This paper proposes a set of tools that can give control entities a more profound insight into the markets and enable them to react to crises more efficiently. The theoretical proposal presented in this paper is a control tool that has its foundation in digital currencies and enables central banks to trace some of their freshly issued money in order to understand the current market activities more profoundly. The second purpose of this basic tool is to enable further tools, which are based on the same technology. The tool that exemplifies the possibilities of the concept in this paper allows money to be targeted to a particular market sector or another market. This paper introduces this original, theoretical system and investigates its possible positive and negative impacts on the economy.

Key words: finance, crisis intervention, electronic money, monetary policy, central bank, blockchain

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Introduction

Multiple causes lead to financial market crises, and the past has shown that it is particularly hard to keep the markets controlled in the end. Now, through the growth of shadow banking and through other continuous technological developments central banks are losing their formerly profound insight into the markets. Attempts to determine the markets schematically are already outdated, but they are still able to show the historical origins of the development (Pozsar et al. 2010).

This paper proposes a new, original and specialised form of electronic money, which is traceable through the markets, Monetary Tracking (MT). The objective of such money is to improve the understanding of systemic monetary flows. The objective is not to provoke a complete surveillance of the financial sector but to enable the detection of possible future issues through trade patterns. The second

objective of this tool is to enable the development of more advanced control and intervention tools. The example used to exemplify the possibilities of the tool in this paper is Monetary Restricting (MR), which has the objective to improve the accuracy of market interventions, particularly in times of crisis. MR allows the central bank (CB) to restrict the use of specially determined money only for a particular market or section of the economy. One of the core ideas behind MR is to prevent the spread from the financial markets to the 'real economy.' Credit crunch and thus interrupted liquidity flows towards the 'real economy' in times of financial distress could be prevented or at least minimised with this technology.

The importance of this piece derives from the current developments within the financial markets. Shadow banking, digital currencies and distributed ledger-based systems are growing day by day, and the regulatory response is still only in its early development. The main intention of the paper is to create an awareness for the problems and to start a discussion about the possible solutions that technology is able to provide. These adaptations need to be discussed thoroughly before being introduced, which is why this very first proposal of such technology-based tools is limited to two basic tools. The two systems or adaptations of trackable money are introduced in this paper to provide an appropriate reaction to the technological developments and systemic changes in the financial markets. Even those two tools would require a monograph to cover all aspects with the thoroughness they deserve. Hence, the objective of the paper is to propose the systems and to start a discussion on all aspects of this particularly multi-layered issue. Monetary Tracking, as proposed in this paper, is not a way to prevent financial crises, but it is a tool that enables a continuing insight in, and hence an understanding of, the markets. The follow-up tools might be able to ease the effects of a crisis or prevent its spread or even its emergence, but that has to be the subject of future debate. This first introduction is only focused on starting a debate on tools based on similar technologies that allow an effective supervision and intervention in the constantly changing financial markets.

The concept might sound farfetched to some, but issues like these will and must occupy all scientists working on financial markets in the coming years and decades. The current Chief Economist of the Bank of England, Andrew Haldane, argued for an idealistically similar solution to MR: 'I have a dream. It is futuristic, but realistic. It involves a *Star Trek* chair and a bank of monitors. It would involve tracking the global flow of funds in close to real time (from a *Star*

Trek chair using a bank of monitors), in much the same way as happens with global weather systems and global internet traffic' (Hal-dane 2014).

The paper first shows the technological basis and origins of the concepts and provides a background for the adaptations that are proposed in sections three and four.

Digital Money

Only three kinds of money are important for this paper: Physical, electronic and digital money. However, to believe that these are all kinds of money in existence would be absurd, as money is disguised and created in many ways today.

Physical money is our everyday and official currency consisting of paper money and coins. We can touch it and transfer it from hand to hand. The definition of electronic money used here is very rudimentary, as it is just seen as the same thing as physical money, the only difference being that it is not tangible. Electronic money makes up for the biggest share of all issued money today. It is just the not printed version of physical money that is transferred electronically.

The last category is digital money, which is a broader variety of specially designed online currencies that are used in certain sub-cultural or market segments, like Bitcoin, BitMint or Digicash. They work like any 'normal' currency. The personal accounts in the respective currency are convertible into any or most official currencies, with a flexible exchange rate. The private issuer guarantees the accuracy of the currency. These currencies can be seen as non-official online substitutes for the official currencies, but up to this point, they play only a marginal role within our system and are not yet able to pose a threat to monetary stability. However, the volume and number of transactions has grown substantially over the last few years (Rob-leh et al. 2014[a or b?]; see <https://blockchain.info/stats>). The growth of digital currencies is exponential, but along with this growth, the number of problems increases as well. The velocity as well as the intensiveness of financial crises within digital currencies are increasing (CNBC 2017). The fact that central banks are already concerned about the possible threat shows their apprehension of possible future challenges. All over the world, numerous government entities have invested money and time into the creation and study of digital currencies. The Bank of England, for example, has established a team to investigate numerous research questions related to central bank-issued digital currencies, which would be a public countermeasure to the currently leading privately owned digital currencies

(Bank of England n. d.). Also the German central bank and the German stock exchange have joined together in an endeavour to create a blockchain-based settlement system for securities (Deutsche Börse 2016). These are just two of the multiple examples of the different and internationally distributed trials with digital currencies.

Some of the currently dominating privately issued digital currencies may play an increasingly important role in the future of our economy, but there is still a chance that they might vanish, as well. However, what they will definitely leave behind are some technological advancements like 'distributed ledgers,' based on blockchain technologies, which is a concept that is about to revolutionise the financial markets. A group of 40 major institutions have already formed a research network to develop the topic (see <https://www.r3.com>). The number of funding companies grew rapidly from 22 in 2015 (R3 2015), and as mentioned before, multiple other entities are also moving ahead with this technology. These ledgers enable a decentralised payment system without a central third party that secures the payments. The ledgers are based on advanced programming tools that enable a secured peer-to-peer transaction with the help of cryptography. Digital signatures, encryption and the presence of money ensure the authenticity of the authorship of a particular transaction or message. The transaction can then be verified by any third party within the network, which means that a centralised ledger becomes obsolete (Rohle et al. 2014[a or b?]). This could mean that distributed ledgers might make obsolete the role of a clearinghouse, which is often held by the CB. However, CBs are not alone in being impacted by the fundamental market changes. The classical banking model will disappear over time, as digital banking and even more advanced systems than that are able to provide the services for the people in a more direct way (Lipton, Shrier, and Pentland 2016).

Monetary Tracking

Monetary tracking is money issued by the Central Bank that is traceable with the help of a mapping system and the technology deriving from the digital currencies. It is primarily an analysis tool that shows entities and at least an insight into trade flows, but its technology can also be the basis for numerous further developments. It is a concept focused on electronic money. The simplified explanation of the concept is that predefined electronic money is marked with an individually identifiable key. The key or mark gets pinned on one electronic 'coin,' which can be pictured as the serial number

on printed money, but that does not have to mean that one coin has to be one Euro or Dollar but might be one million Euro. The mark could then be dividable in order to minimise the required server space. The electronical mark would make the particular note traceable through a mapped system of companies and entities. Hence, the CB gets a notice of transition if a coin is transmitted from one entity to another. This would allow mapping the interactions when the master accounts are cleared at the end of each trading day. General tendencies and flow tendencies could be deducted. A limitation is of course that most money used in the system is privately created money and not issued by the central bank, but models are able to respect this fact in the analytics of the system. MT is a highly automated system, as the marking, tracking and analysis of the movement is made automatically. MT does not require any changes, as the appearance of the electronic money remains the same. The only accountable change is that the money will need a little bit more disk space than before, but even this difference will not be significant, when a smart technical design is employed. The analysis output would not only allow more profound insight into the markets, but some important key indicators should also be made available publically. The rest of the database should be accessible for companies, central bankers and researchers with a particular research interest in order to improve the acceptance of the stakeholders.

For a better understanding of the system, a possible issuance of MT-marked money is exemplified here: The CB management decides to mark a certain percentage of newly issued money, which is then issued together with all the rest of the regularly issued money. The marked coins are issued randomly to the receivers of central bank cash. The movement of this money is then tracked through the financial system, until the money is either exchanged to another currency, withdrawn as printed money or paid back to the CB. The two first barriers are legal barriers for a first introduction and not necessarily technical issues. The documented movements of the 'marked coin' are saved within the CB and can then be analysed. The private banks handling money do not see which money is traced, but they have to provide the CB with a mapping system of their accounts in order for the CB to see where the coin moved.

The system introduced here is a first step that can trigger many follow-up innovations and developments, such as international coordination to keep money trackable across currency borders. MT could become the basis for even more tools, if all electronic money was marked, i.e. all high-powered money and the bank reserves, as well.

Such a universal system would enable a very detailed market analysis for all stakeholders of the financial markets, especially as this would include the money created within the system. However, these and many other possibilities for further developments have to be discussed in other papers, as the implications of all of these issues exceed the confines of this paper.

The advancements in cyber security, in particular those in digital signatures and public-key cryptography, as well as the advancements in digital currencies show that the system is feasible. The possibility for all parties involved to analyse the worldwide trading patterns opens new opportunities for strategic behaviour, but it prevents one entity from controlling the rest. Of course, the limits of the system have to be determined in order to prevent a totalitarian state. Clear restrictions have to be the core legal borders for MT and all of its tools, and they are crucial for its success. These will be evaluated in the last chapters of this paper.

Monetary Restricting

Monetary restricting is a freely chosen name for a monetary tool that builds on the technology used for MT . MR is one example of a tool based on the technology behind MT , but it does not need an introduced system of MT to function. MR is money issued by the central bank with a particular purpose or target area. The central bank is able to limit its usage to a market or region in order to fight monetary outflow or credit crunches in times of crises. MR works on the basis of marked money and is nothing else than the permission for the CB to assign some of the marked money to a specific use, area, partial market or purpose, for example the European or even the Greek real economy. Such a tool would be able to provide the so-called real economy indirectly with fresh credit even if the private banks are struggling with liquidity or asset difficulties. The central bank has hence not the power to finance a state with this tool, but it is only able to support a particular 'real economy,' market or region. The use of MR presented here, to prevent credit crunches is only an exemplified use of the tool, as other applications or political targets are imaginable, but it is a very rewarding example, as it shows the power, but also the problems, of the tool without being too controversial a topic. A brief discussion on credit crunches will follow after this part, and it will show the remaining reasoning behind the tool's design. MR can obviously be a very controversial tool, which is why it needs to be restricted carefully. Unlike MT the money issued under MR needs to be easily identifiable for all stakeholders in order to

enable the banks to deal with it appropriately.

MR distinguishes itself from direct governmental funding and selective credit controls, as the CB provides the money to the private banks, as always, through credit. The difference, if MR is implemented for a determined period, is that a certain share of the money is marked. The marked share of the issued money is determined in use by the CB. The size of the share cannot be influenced by the private banks. It is solely determined and implemented by the CB, which in the current example means that under MR the CB would dedicate a share of all money credited to private banks, in a particular period, to crediting the 'real economy.' The CB on the other hand does not have the ability to influence the private banks in the decision which company from the 'real economy' receives a credit and which does not. The share has to depend on the severity of the crisis, but it should always ensure the survival of the private banks. The banks and financial entities need to be able to rebuild their equity ratios and prevent their bad assets from impacting their entire company in times of crisis, especially if ratings are dropping and obligatory equity cushions have to grow exponentially (Beck 2012; Mizen 2008; Ioannidou 2012).

The trick with the marked money is that the serial numbers in use are prohibited from being accounted for in equity ratios and asset coverage in general. This step circumvents the banks' own need for liquidity and forces the banks to rethink the possibility of distributing credit to the real economy. The private banks are thus still fully in charge, but some of the money they received from the CB is not usable for anything other than for the distribution to the real economy. Therefore, they only have the chance to either provide credit and gain a possible profit from it or leave the money in their accounts without doing anything with it. This also means that they are, as usual, stuck with the risk of an investment, so that MR does not help to keep unprofitable companies alive, but it prevents monetary outflow and many aspects that lead to a credit crunch, which helps to keep well performing companies from getting impacted by systemic financial struggles.

The technical side of the exemplified restricting goes along with the introduction of an easy categorisation process based on a traffic-light system. Trackable or marked money will be distributed to the market with the restriction that it can only be used for investments, credits and any other form of monetary flow to the green and yellow traffic-light market sections.

The traffic-light system distributes all companies of one economy

into different groups. All companies represented in the traffic system of one CB need to be part of the underlying common or national market. Foreign companies cannot be accounted for in one of the categories. A company's affiliation within a particular section is calculated by its main source of revenue. These affiliations must be proven, which can be done rather easily, as the private banks have profound insight into the company's situation in any case. The CB then only has to use a randomised sample to control these affiliations.

The green section comprises companies gaining less than five per cent from financial activities within a three-year averaged period. Companies in the yellow area are companies with averaged revenues of five per cent to less than 50% through financial activity over the last three years. All companies above this percentage are grouped together in the red section. In critical cases, the CB is supposed to investigate individually if the assignment to one of the groups is correct or not. To improve the success rate of MR all tendencies like the investment into letterbox companies or other circumvention mechanisms that private banks might want to employ should be penalised.

The groups of this provisional determination have been chosen because most small and medium-sized companies are in the green, but also in the yellow group, without direct access to CB money. These companies are impacted the quickest and hardest by credit crunches, as there is a reported tendency of financial institutions to prefer loans to larger companies in credit-crunch situations (Buera, Fattal Jaef, and Shin 2015). Additionally, these companies are statistically not as agile with their production factors as bigger companies, which leads to higher rates of laid-off employees among these companies in comparison to bigger or more established companies (Zhang, Yang, and Long 2014). This process, together with the reallocation and the contraction of investments leads to a macroeconomic recession (Buera, Fattal Jaef, and Shin 2015), which emphasises the importance of a working intervention tool. MR is intended to provide a first monetary policy tool that can help to impact credit crunches.

The objective of MR is thus to direct monetary flows towards a specific objective, in this case to the green and yellow areas of an economy. The purpose of this is to minimise the risk of credit crunches and thus to contain the spread of a financial crisis to the rest of the economy.

Credit Crunches and the Central Banks

Bernanke and Lown (1991) describe a credit crunch as an abnormally large decline in the credit supply for a given stage of the business cycle. Owens and Schreft (1995, p.65) define the same 'as a period of sharply increased nonprice credit rationing.'

A credit crunch is thus a situation in which banks and other lenders retreat from lending and focus most of their resources on other activities with higher potential profits within the financial markets or in other regions of the world. The limited resources force the real economic market participants to reallocate their own resources, cut back investments and lay off employees. This circle can lead an economy into a deepening recession. Mishkin (2008, p.67) outlines one possible scenario in his description of a feedback loop between lending and rising equity values: 'At some point, however, the bubble bursts. The collapse in asset prices then leads to a reversal of the feedback loop in which loans go sour, lenders cut back on credit supply, the demand for the assets declines further, and prices drop even more.'

On the other hand, a credit crunch is not necessarily a consequence of an economic downturn (Clair and Tucker 1993). It is important to know that lending does not only react to the creditworthiness of a project but also to the capacity of the bank's balance sheet and the capacity of off-balance sheet entities owned by the bank to compensate further risk, which leads to pro-cyclical behaviour. The last important issue that lending depends on is the soft factor of trust. If the companies distrust each other, lending decreases (The Committee on International Economic Policy and Reform 2012; Mizen 2008; Aliber and Kindleberger 2000).

The financial market has also proven itself to be able to absorb the greatest part of the issued money without preventing contagion at all, as observable in the problems following the sub-prime crisis (Mizen 2008; Ait-Sahalia et al. 2009). Models have estimated that financial shocks on leveraged sectors and the redistribution between these sectors accounted for approximately two-thirds of the output collapse in the time after the subprime crisis (Iacoviello 2015). In the case of the subprime crisis, the cycle of an increasing accumulation of problems, which is nothing else but a crisis, was also driven by the cross-market linkages and spread via liquidity channels (Allen and Gale 1999; Longstaff 2010). The habitual business-cycle movement does usually not cause a credit crunch. Usually the lending entities recover relatively quickly after a downturn. The actual causes for

credit crunches are multiple, like overestimation of risk, the necessity for banks to rebuild their equity base, capital adequacy ratios and misregulation (Clair and Tucker 1993; Zhang, Yang, and Long 2014). In conclusion: The credit crunch can be a result of the willingness to lend. The basis of this issue is trust, which is a big issue that MR cannot solve, but other than that monetary restricting is able to circumvent all of the described problems and should thus be able to help to stabilise the system.

Economic Impacts

The financial markets were able to partially outgrow the direct influence of the CB with the help of technological advancements. The outgrowing process can mainly be credited to the so-called shadow-banking sector. These unregulated parts of the financial markets are already responsible for a third of the market activity in finance, and the growth tendencies indicate that the market share of the shadow banking sector will continue to increase faster and faster over the next few years (European Central Bank 2014; Constâncio 2015a; Kregel 2010). The shadow-banking sector grew faster than its financial competitors did. The sector grew from 2003 to 2013 from 9 trillion Euro to 19 trillion euro. The volume of insurance companies and pension funds 'only' doubled from 4 trillion Euro to 8 trillion Euro within the same period. The banking sector residing in the Euro area, excluding monetary financial institutions, grew from 19 trillion Euro to 30 trillion Euro in the same period (European Central Bank 2014). Since mid-2012, the velocity of the growth of the highly diversified shadow-banking sector has even increased, as the assets of the shadow-banking sector already amounted to 23 trillion Euro in mid-2014. This means that such a development, if continued, will lead to a financial system within the entire Euro area in which the shadow banking system will be bigger than the regulated banking sector within five years as of 2015 (Constâncio 2015a).

These entities emerged through a market need for security and accountable promises that the central banks did not provide, while regulatory reforms were suspended. These markets developed an exceptional system of money creation that was, and for the most part still is, completely out of reach for any regulatory power (Gorton 2010; Kregel 2012).

The shadow banking activities go hand in hand with advanced technological products. These uncontrolled activities are highly profitable for the most part, but at the same time they are a source of systemic instability and a risk for the entire financial market (Ton-

veronachi 2015). The growth tendencies of the shadow-banking sector are not surprising, as the banking, system underlies a set of regulations and ratios, which do not apply to the shadow banking entities. Many vehicles of the shadow banking markets work with extremely high leverage ratios, which comes not only from the reuse, repackaging or re-pledging of collateral, but also from reusing or re-pledging securities to obtain new loans. This re-pledging process of using collateral multiple times leads to hidden leverage and a multiplying effect (Kalinowski 2012). This cyclical behaviour leads to the conclusion that the vehicles of the shadow banking sector and their asset managers are crucial suppliers of collateral and at the same time important demanders of 'safe, short-term, liquid instruments, or non-deposit money-claims' (Singh and Pozsar 2011, 3-4). This means that the continuously growing shadow banking sector has created a well performing, 'self-refuelling' circle of money creation, which works in multiple layers so that the description above is only a short cut-out of the entirety of the process. Kalinowski (2012, 6) explained the reason for the cycle with these words: 'For assets managers, it is cheaper to obtain liquidity in this manner than borrowing in the old-fashioned way. For commercial banks, securitization offers substantially higher profits than traditional lending.'

For this paper, the shadow banking tendencies mean that the central bank is continuously losing control over the monetary system and thus over the outcome of its own policies, especially if distributed ledgers and digital currencies continue their growth and destroy another part of the insight on the markets that the cb currently still has. The less the controlling entities are able to keep a profound insight on the markets, the less effectively they are able to work. MT is a first step on the side of monetary policy; the issues of financial regulation remain unresolved, but monetary tracking can make market estimations more realistic and meaningful. Already in the first stage, it is able to shed light on the interaction patterns within the shadow banking markets, and with that, it could deliver possible arguments for more precise financial-market regulations. In more developed stages MT is actually able to depict the monetary flows with precision, and even the issue of private-entity money creation is not a problem as described above, but MT is no miraculous tool either, as it can only engage one side of the problem.

The ECB is very open-minded with regard to modern tools, which are able to improve the performance of the cb in any way. Vítor Constâncio put it thus: 'The monetary policy experience of the past seven years is reviewed. In pursuit of its objectives, the ECB has been very

flexible in adjusting and expanding its toolkit' (Constâncio 2015b, 1). The ECB Banking Structure Report 2014 states: 'This increased divergence of financial cycles in boom periods calls for differentiated and well-targeted policy responses that are properly tailored to individual jurisdictions in order to address specific emerging risks in those countries' (European Central Bank 2014, 50–51). This clearly shows the ECB's determination to adopt new and technically adequate tools for more precise monetary activity, which is why this proposal should be considered to be one alternative.

Limitations and Research Outlook

All tracking tendencies are always two-sided, and one should understand both the positive and the negative sides, the misuse and trade of private data and the improved online-surfing experience. The same is true for the data generated through MT. So tracking of numerous activities on- and off-line is very famously in use and leads to the creation of billions of electronic portraits. The question remains why central banks should not be enabled to create rough 'electronic portraits' of the financial entities within their area of influence to improve the systemic stability. These data sets could be used to identify possible contagion risks, credit crunches and other eruptions within the monetary flows, which could then trigger more efficient reaction tools.

Another problematic side of such a tool is the possibility for private companies or hacker groups to build a subsystem with available private datasets, which has to be prevented, as this could trigger a race-to-the-bottom situation in which all companies compete on such analysis systems without helping anyone, while incentivising gaming behaviour. The system is only beneficiary for the society if either all stakeholders or only the public control has access to the produced data or a share of the data. Of course, the micro data from within the companies has to be protected from the private users in order to prevent espionage.

MT allows generating data in a quantity and quality that has never existed before, which enables an understanding of the current situation of the markets with much more profundity. This capacity of analysing monetary flows within the financial system can improve crisis prevention and reaction mechanisms, especially if private and public entities join their analytic tools to stabilise the system.

Cybersecurity generally is a crucial topic for this system, but also in general is it a field of growing importance for our society. Different financial market entities have already repeatedly been targets of

cyber-attacks (CPSS-IOSCO 2011). Cybersecurity and cyberterrorism are two important issues that will take up more space in the future. International treaties and co-joined international working groups on cyber security between different big international players emphasise this fact (Williams 2015; The Associated Press 2014; Zhernov 2014). The security of the systems thus has to be up to the highest standards. Otherwise, the trust that the system tries to improve would vanish and reverse quite quickly.

A particularly beautiful aspect of *MT* is that it is a monetary policy tool. The *CB* can introduce it without needing the consensus of governments on how to restrict or control the shadow banking sectors. *MT* can be introduced by the *CB* in a trial run and could be perfected over time with ever-growing trial rounds before thinking about a complete systemic introduction.

Conclusion

A much more profound analysis of the consequences will be required in order to develop the concept further. This introductory paper was only able to touch upon many issues and hence further papers regarding the numerous critical aspects are needed for a further development of the tools. Monetary Tracking and especially Monetary Restricting are controversial technologies, but they might be less controversial than the long-term effects of some monetary policies that are in place at the moment.

MT is a technology-based analysis tool that enables an insight into the markets, but it is also the technological basis for much more profound tools. Monetary Restricting, one of many possible tools based on the same technology, is able to tackle some issues that financial market crises create. The tool helps to contain the crisis within the market it originated from.

This paper is too short, of course, to mention all aspects in necessary depth, but it is a contribution to the discussion on how to deal with the upcoming technological changes that will impact the financial system profoundly.

References

- Ait-Sahalia, Y., J. Andritzky, A. Jobst, S. Nowak, and N. Tamirisa. 2009. 'How to Stop a Herd of Running Bears? Market Response to Policy Initiatives during the Global Financial Crisis.' IMF Working Papers 204, International Monetary Fund, Washington, DC.
- Aliber, R., and C. P. Kindleberger. 2000. *Manias, Panics, and Crashes*. 5th ed. Hoboken, NJ: Wiley.

- Allen, F., and D. Gale. 1999. 'Financial Contagion.' *Journal of Political Economy* 108 (1): 1–33.
- Bank of England. N. d. 'Digital Currencies.' <http://www.bankofengland.co.uk/research/Pages/onebank/cbdc.aspx>
- Beck, T. 2012. 'Why the Rush? Short-Term Crisis Resolution and Long-Term Bank Stability.' *Vox*, 16 October. <http://voxeu.org/article/why-rush-short-term-crisis-resolution-and-long-term-bank-stability>.
- Bernanke, B. S., and C. S. Lown. 1991. 'The Credit Crunch.' *Brookings Papers on Economic Activity* 22 (2): 205–47.
- The Committee on International Economic Policy and Reform. 2012. *Banks and Cross-Border Capital Flows: Policy Challenges and Regulatory Responses*. Washington, DC: Brookings.
- Buera, F. J., R. N. Fattal Jaef, and Y. Shin. 2015. 'Anatomy of a Credit Crunch: From Capital to Labor Markets.' *Review of Economic Dynamics* 18 (1): 101–17.
- Clair, R. T., and P. Tucker. 1993. 'Six Causes of the Credit Crunch (Or, Why Is It So Hard to Get a Loan?).' *Economic Review*, no. 3: 1–20.
- CNBC. 2017. 'Ethereum Price Crashed from \$319 to 10 Cents on GDAX after Huge Trade.' CNBC, 22 June. <http://www.cnbc.com/2017/06/22/ethereum-price-crash-10-cents-gdax-exchange-after-multimillion-dollar-trade.html>
- Constâncio, V. 2015a. 'Financial Stability Risks Monetary Policy and the Need for Macroprudential Policy.' Speech at the Warwick Economics Summit, Warwick, 13 February
- . 2015b. 'Monetary Policy Challenges in the Euro Area – The Power of Policy: Solving Problems and Shaping the Future.' Paper presented at the 3rd Annual Conference of The Marshall Society, Cambridge, 30 January.
- CPSS-IOSCO. 2011. *Principles for Financial Market Infrastructures*. Basel: Bank for International Settlements.
- Deutsche-Börse. 2016. 'Joint Deutsche Bundesbank and Deutsche Börse Blockchain Prototype.' <http://deutsche-boerse.com/dbg-en/media-relations/press-releases/Joint-Deutsche-Bundesbank-and-Deutsche-Boerse-blockchain-prototype/2819826>
- European Central Bank. 2014. *Banking Structures Report 2014*. Frankfurt am Main: European Central Bank.
- Gorton, G. B. 2010. *Slapped by the Invisible Hand: The Panic of 2007*. Oxford: Oxford University Press.
- Haldane, A. G. 2014. 'Managing Global Finance as a System.' Speech given at the Maxwell Fry Annual Global Finance Lecture, Birmingham, 29 October.
- Iacoviello, M. 2015. 'Financial Business Cycles.' *Review of Economic Dynamics* 18 (1): 140–63.
- Ioannidou, V. 2012. 'A First Step towards a Banking Union.' In *Banking Union for Europe: Risks and Challenges*, edited by Thorsten Beck,

- 85–95. London: Center of Economic Policy Research.
- Kalinowski, W. 2012. *Shadow Banking and the Moral Hazard: Principles for Reducing Model-Based Opacity in Securities Finance*. Paris: Veblen Institute for Economic Reforms.
- Kregel, J. 2010. 'No Going Back: Why We Cannot Restore Glass-Steagall's Segregation of Banking and Finance.' *Public Policy Brief*, no. 107.
- . 2012. 'Using Minsky to Simplify Financial Regulation.' http://www.levyinstitute.org/pubs/rpr_04_12_kregel.pdf
- Lipton, A., D. Shrier, and A. Pentland. 2016. 'Digital Banking Manifesto: The End of Banks?' Report, Massachusetts Institute of Technology, Boston, MA.
- Longstaff, F. A. 2010. 'The Subprime Credit Crisis and Contagion in Financial Markets.' *Journal of Financial Economics* 97 (3): 436–50.
- Mishkin, F. S. 2008. 'How Should We Respond to Asset Price Bubbles.' *Financial Stability Review* 12 (October): 65–74.
- Mizen, P. 2008. 'The Credit Crunch of 2007–2008: A Discussion of the Background, Market Reactions, and Policy Responses.' *Federal Reserve Bank of St. Louis Review* 90 (5):531–67.
- Owens, R. E., and S. L. Schreft. 1995. 'Identifying Credit Crunches.' *Contemporary Economic Policy* 13 (2): 63–76.
- Pozsar, Z., T. Adrian, A. Ashcraft, and H. Boesky. 2010. 'Shadow Banking.' Staff Report 458, Federal Reserve Bank of New York, New York.
- R3. 2015. 'R3's Distributed Ledger Initiative Adds 13 Additional Bank Members' Press Release, New York, 29 September.
- Robleh, A., J. Barrdear, R. Clews, and J. Southgate. 2014a. 'Innovations in Payment Technologies and the Emergence of Digital Currencies.' *Bank of England Quarterly Bulletin* 54 (3): 262–76.
- Robleh, A., J. Barrdear, R. Clews, and J. Southgate. 2014b. 'The Economics of Digital Currencies.' *Bank of England Quarterly Bulletin* 54 (3): 276–86.
- Singh, M., and Z. Pozsar. 2011. 'The Nonbank-Bank Nexus and the Shadow Banking System.' IMF Working Papers 289, International Monetary Fund, Washington, DC.
- The Associated Press. 2014. 'us to Ask China to Restart Cyber Working Group.' *New York Times*, 27 June 27. http://www.nytimes.com/aponline/2014/06/27/us/politics/ap-us-united-states-china.html?_r=0
- Tonveronachi, M. 2015. 'A Critical Assessment of the EU Monetary, Fiscal and Financial Regulatory Framework and a Reform Proposal.' Working Paper Series 132, FESSUD, Leeds.
- Williams, M. 2015. 'What to Expect in the us-China Cyber Treaty.' *InfoWorld*, 24 September. <http://www.infoworld.com/article/2986314/hacking/what-to-expect-in-the-us-china-cyber-treaty.html>
- Zhang, H., F. Yang, and F. Long. 2014. 'Credit Crunch and Target Capital

Structure? Empirical Studies Based on Natural Experiment.' *Emerging Markets Finance and Trade* 50 (5): 229–44.

Zhernov, V. 2014. 'Russia, China Prepare to Sign Unique Cybersecurity Treaty – Report.' RT, 21 October. 2014. <https://www.rt.com/politics/197812-russia-china-network-security/>



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Article III

Fischer, Dirk-Hinnerk; Krimmer, Robert (2018) "Towards a Networked Modern Democracy - Thoughts on How ICT Could Enable New Forms for the Relationship Between Citizens and their Representatives" dg.o 2018: Proceedings of the 19th Annual International Conference on Digital Government Research (3.1)

Towards a Networked Modern Democracy - Thoughts on How ICT Could Enable New Forms for the Relationship Between Citizens and their Representatives

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Abstract

Information and communication technologies (ICT) have changed many systems substantially in recent decades. The way we interact, the way we do business, the way we share news and many more aspects have been changed. For almost all people on the planet, the way we vote has not yet been impacted at all, or at least not substantially, by these technologies. This paper proposes a system that is based on electronic voting applications. The system is continuous and could be complementary to any electoral system employed today. The system gives citizens a chance to impact politics at any point in time while protecting the stability of the democratic system. Such a system would help to minimize apathy and systemic disengagement. This paper aims to illustrate the profound changes that ICT could bring to our democracies and to promote a discussion about such changes.

Keywords

Electronic voting, Democracy, Democratic innovation

ACM Reference format:

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1.0 Introduction

A new election system is presented in this paper, which is developed from the well-established concept of recall

elections. The proposal is enabled by electronic developments and aims to move our democracies closer to a third transformation of democracy. The objective of this paper is to trigger a discussion about the possible profound changes that different applications of e-voting can have, in order to determine the desirability of certain electronic innovations. The most important change caused by the system presented here is the continuity of the election, which means that elections proceed continuously. Every person that is allowed to vote can vote and eliminate their earlier votes as often as they like. Crucial is that all this does not destabilizing the government, administration or society and without threatening the position of the members of parliament on a daily basis. The system provides a feedback mechanism and the ability to become "unelected" during the normal election term, without legal misconduct, which is an important aspect for the incentive system of a government to be efficient and effective. For a democracy in general applies that it is not important who you elect or when you vote but that the government is under a possible threat of being replaced [1], which the proposed system could add to our current election systems. Thus, the result of the election system does not only represent the particular public opinion on one fixed date but also gives politicians continuous feedback on their work and gives the population a continuous influence on the political process, rather than just every four or five years. There is also no initialization process. The program starts automatically with every classically held election. The continuously updated current standing of the election can be checked online. A side effect of systems like this, which employ an aspect of more direct democracy, could be that policy apathy within the population might decrease. The system shows that by only employing the old voting processes, considerable opportunities would be lost. Students of informatics learn early on that it is not purposeful to only adopt paper-based systems and structures in the digital world [2], so why should we do this with our election system? A more interactive, effective system that gives the individual voter a greater ability to adapt his political position to the day-to-day developments in the world and gives politicians indirect feedback about their policies and behavior is possible. While this system will not be able to resolve the apathic or

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disillusioned state of all voters, its flexibility and almost interactive features will offer voters an increased ability and many more ways to influence. "The less they participate, the less government can be held accountable, the less individual rights can be enforced, and the less individuals' and groups' demands can be represented in the policy process" [3].

For the tool proposed in this paper, the construction of the underlying political system is of no importance, as long as it is a democracy, as the tool does not impact the construction of the system. Democratic intervention is an additional layer that does not alter any of the established systems. This system has the power to reinitiate the election process, but it has no impact on the how this re-election happens. The proposal is also based on the assumption that the current technical difficulties of e-voting in modern democracies are resolved. Of course, we are aware that cybersecurity is in a constant development and will most probably not be resolved within the next years, but this paper cannot go into technical specifications, as it is just not possible to reflect the complex current technical discussions appropriately, while introducing a theoretical concept in the same paper. The privacy of the vote must be guaranteed, while transmission and storage questions must also be reasonably addressed. Large steps have been made and continue to be made toward answering these questions all over the world by various players and countries. The purpose of this paper is to start a discussion about how e-voting might help our democracies to become more effective, more interactive and more attractive to modern human beings. The paper focuses on national, regional and local elections, but the presented system could be adapted for election systems in international organizations, companies, supranational entities, central banks and all other institutions as well.

The paper starts with a brief description of the development of democracy in relation to technological developments. This section is intended to show the dangerous aspects that democratic intervention is trying to avoid while improving the quality of democratic and election systems. The following subsection discusses electronic democracy in more detail. This section prepares the foundation for the presentation of the election system.

2.0 Aspects of Democracy that influence Democratic intervention

Elections are the fundamental tool of all democracy. How these elections are conducted, counted and regulated influences a democracy and its development fundamentally. Elections and how they are conducted can also show the position of a particular society concerning innovation, change and technology. Election systems are a product of historic and traditional developments and during the same period in which technologies develop election systems, election regulations and election technologies will also evolve. Since the first industrial revolution, technology and innovation have

regularly reformed our society, living conditions and perception of life [4]. Although democratic structures or partially democratic structures can be found in the antique advanced civilizations (for example, in early Indian civilization), ancient Athens is perceived as the crib of modern democracy [5]. Here, Cleisthenes's reforms of the constitution were adapted in 507 before Christ. In addition, from here, other forms of direct democracy, such as ancient Roman democracy, the democracy of the Swiss Cantons, and the Ting culture of the Vikings, developed. All these forms of democracy were bound to direct, personal contact between citizens. While ancient Greece is seen as the source of modern democracy, it was the republican form of ancient Rome that opened the door for the current form of democracy [6]. The next development in democratic structures happened only in the late 18th century when nation states arose. At that time, representatives became necessary, as the systems were too big to allow all citizens the same right of speech. This new and indirect form of democracy spread around the planet in three waves [7]. Democracy developed from France and the United States of America until it achieved its now globally dominant position among the forms of government [8]. This rather rapid development was enabled by the most fundamental principle of democracy, namely that all members of a society are equal and that all of members of a society enjoy the same rights and the same right to influence political decisions [9]. It was also Dahl who was the first to call these developments of democracy the first and second transformation of democracy [5]. The worldwide trend towards lower turnout and the rapid development of information and communication technologies (ICT) has led many researchers to talk about a third wave of transformation. This transformation is the transformation towards electronic democracy. Niccolò Machiavelli described a cyclical development from stability to instability. This cycle is, in different variants, observable here, as the development of democracy triggers such a cycle. In general terms, the cycle can be summarized as follows. A calm and distant government rules in calm times, which keeps the peace, but this calm style of governance can lead to a lazy approach towards necessary reforms. These unapproached reforms and outdated governance structures can then again lead to increased instability in the system [9]. Machiavelli attested that democracy has a tendency to slide into anarchy. A democratic process that allows representatives to be constantly challenged by opposition and the population is hence crucial for the long-term success and stability of the system. Finding a path between challenge, bore-out and burn-out depends strongly on the individual election system and the individual election formalities. The number of democracies worldwide rose rapidly during the period after the Second World War, and the systems are unique for every single country. The fall of the Soviet Union and the Arab Spring have emphasized these developments once again in recent decades. The opposing tendency to these developments

is the fact that old and new democracies must face questions of legitimacy. Questions like these can be mirrored in different facets. One sign is the decreasing turnout numbers and election satisfaction [11]. Another sign of this tendency is the increasing gap between the public and its representatives. The third manifestation of the tendency is increasing political apathy [12]. The accelerated technological development that occurred after the Second World War was not only part of the already described positive developments in democracies but also triggered an intensive debate about the future of democracy itself. Fromm [13] argued that technology would possess the ability to elevate society from its missing ability to all-inclusive decision making. The wave of decreasing turnout in the 1980s led to a re-emergence of this discussion [14]. One proposal of this discussion contains digital town hall meetings that enable the citizens of large cities and communities to participate in decision making in more ways [15]. Another proposal was the "minipopulus," a society that consists of only 1,000 citizens who are supposed to govern their society with the help of technologies. The proposal is based on the idea that budgetary cuts could be realized on every level of government if the citizens were to be able to vote and elect from everywhere, creating a particular form of direct democracy [5]. This discussion re-arose with the broad availability of the Internet at the end of the 20th century. The dominant opinion was that the revolutionary developments in e-commerce and e-governance would also influence the democratic process and lead to an e-democracy. A virtual Agora and a complete transformation to an electronic republic were predicted [16]. The opposition to these optimistic voices was afraid of a digital divide within the society, as access to and knowledge about ICT are not distributed equally within the society [17].

2.1 Electronic Democracy

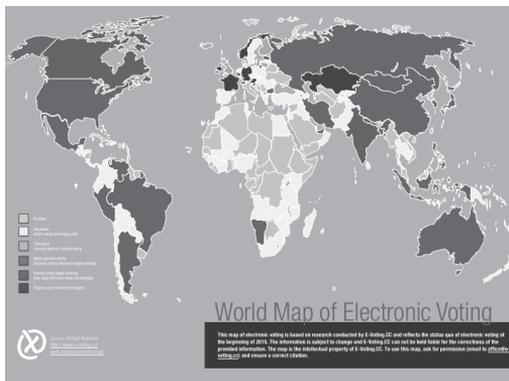
Electronic democracy did not develop as rapidly as the other sectors of the electronic transformation of our society and economy. Although many politicians are part of initiatives for e-governance, they do not necessarily support the idea of an electronic democracy. The reasons are multiple, with one of the most prominent fears being the loss of power [18]. The most negative possible outcome for politicians that might explain their reluctance is that if all the power shifts directly to the citizen, who can decide everything online, there would no longer be a need for representatives [19]. However, the reservations about e-democracy are not without drawbacks, as an intelligent use of ICT could help to establish a continuous and improved dialog between citizens and representatives. Without the support of ICT, a continuous election process would be unpractical and tremendously expensive, and real-time analysis of the results would be impossible. In the best case, politicians could inform citizens

directly and without any trouble. The advantages of such a dialogue are rather obvious because the representative is surer to represent the will of the people and the citizen feels represented [20]. This scenario is a more sustainable composition than two entities living and working in the same country but in unrelated spheres. This idea of the absolute direct democracy lies in direct opposition to the description of representation by Madison. He states that only the representatives but not the majority of the citizens can be made reliable for the outcome of a policy [21]. This situation would change with a direct democracy, and many citizens do not wish to carry that burden, which might explain another aspect of the current reluctance.

The discussions about the theoretical potential of ICT to transform democracy also developed in waves. Such discussions spread at different times in Europe and the United States of America. The website MoveOn.org was the first US-based organization that recognized the potential of the internet for future political campaigns. During the campaign of Howard Dean, MoveOn.org was the first organization to contact potential voters digitally. Only four years later, the internet was already the most important tool in financing Barack Obama's campaign. The background for these changes in importance was that in the meantime, the big social networks, such as Facebook, arose [22]. Nevertheless, the structure of the federal administration in the USA means that organizations that are not part of the government, such as AmericaSpeaks.org, have to provide most means of communication between representatives and voters [23]. The situation is different in Europe, where the internet has to gain influence in the election process, as the parties have access to public funding. Many governments see ICT as a medium for electronic petitions, such as the Scots Parliament [24] or the German Bundestag [25]. Other than that aspect, electronic democracy has not yet received much support from the governmental side. However, international organizations, such as the Council of the European Union, could play an important role in the development and support of aspects of electronic democracy. The Council of the EU already followed a report from a group of experts that proposed numerous steps for modernization [3]. In 2005, the Council created a focus group that aimed to find out what electronic democracy could look like and that later issued proposals for improvement for the member states. This working group defined electronic democracy as "the support and enhancement of democracy, democratic institutions and democratic processes by means of ICT" [26]. As part of these recommendations, 33 methods and recommendations were presented. These proposals were based on the recommendations of the member states [27]. In addition to Estonia, countries such as France, Australia and Switzerland, provide internet-based election services, focused primarily on

citizens living abroad, but the development is far from uniform. The Netherlands and the United Kingdom ended their trials with internet voting in 2007 and 2008. Figure 1 shows a brief summary of the worldwide developments. Greenland would be colored as Denmark.

Figure 1:



Source: [28]

3.0 Democratic Intervention and its Abilities

A different society needs a different democracy. An entirely transformed society will not be willing to perform its democratic duties in the same way its great-grandparents did. If e-administration is supposed to trigger a “society of participation,” a changed election system is an unavoidable step to motivate and incentivize citizens to participate. Therefore, the influence of the citizens must be important and strong enough to incentivize participation. Democratic intervention is a system that is a fundamental development of the “recall election” process. This election mechanism dates back to classical democracies, but it is also represented in several modern democracies, such as several Swiss cantons, some Peruvian municipalities and certain states in the United States of America. Recall is a process that is usually initiated by a petition. The petition must reach a certain benchmark of the ballots cast in the last election or the total election population of the particular state. If the petition is successful, a recall election is to be held in which citizens have the opportunity to replace the official. The officials get replaced by absolute or relative majority, depending on the state and the particular design of the recall [29]. A famous example is the 2003 recall election of California Governor Gray Davis and his victorious opponent, Arnold Schwarzenegger [30]. Another well-known example is the referendum against Chavez in Venezuela in 2004 [31].

Democratic intervention is not a tool that can be initiated by opposing political parties or interests and is hence not a tool

with clear political intention, as it is initiated automatically after the “normal” election is held in the particular country and system. Democratic intervention could be understood as an adaptive, informative and continuous form of the petition of the recall process, but that would be a harsh abbreviation of the system, as the democratic intervention system surpasses the capabilities of a classical recall procedure by far. The votes cast through democratic intervention can hence be understood as negative votes, as the voter votes against a person or entity.

A first advancement in democratic intervention is that all voters are eligible to vote in every category, regardless of whether they voted in the last election or which party or politicians they supported. Democratic intervention allows citizens to recall representatives, parties, cabinet members, the entire cabinet and the government. Depending on the underlying system, democratic intervention can also recall the chancellor, prime minister or president. The concept involves an internet-based election system that is added to the existing election mechanisms and runs continuously, without initialization in the background. Votes can be cast, withdrawn and recast at any point in time. Every vote cast for one representative, party or government is accounted for and accumulated with all the rest of the votes. The results are accumulated, analyzed and published continuously and in real-time. The system is applicable if a solid internet-based voting system is in place. The number of votes for representatives, parties or governments can hence be observed and analyzed by everyone at any given point in time. Statistical and graphical tools provided by the election office would further increase the attractiveness of this information and the feedback aspect of the system. If the accumulated number of negative votes cast for an individual representative, party, government, chancellor, president or minister reaches a predetermined percentage at any given point in time, even if only for a millisecond, that person or entity is recalled. The benchmarks for the different categories must be different, but this aspect will be elaborated in detail later. If the government reaches this percentage, a new election must be held. It must be mentioned at this point that such a system would represent a leap forward, as most governments are not elected directly by the people but by their parliament. This fact does not mean that the people should be denied the right to recall a member of government or the entire government directly. It is also an interesting thought to put a minister, chancellor, prime minister or president under possible direct pressure from the population. If a party reaches the predetermined percentage line, its number of seats get cut in half. The lost seats get redistributed among the other parties according to the last election results. The benchmark of losing 50 percent of the seats was chosen to work against the incentive for big parties to unite in mobilizing their voters to kick out smaller parties.

If a cabinet gets recalled, the positions must be refilled with other candidates. Members of the old cabinet are not eligible in that case. If representatives lose their particular seat, a successor from the same party becomes a new member of parliament. The measure of being recalled should be rather clear with these examples.

The "normal" positive election process is not impacted by the system proposed in this paper. It is hence also not important for this paper to discuss the differences among the different election and political systems. Democratic intervention can be seen as another layer of the particular system in each country that has no structural impact on the existing democracy. Democratic intervention can be pictured as another control tool that enables a stable and more feedback-oriented democracy, without touching or changing any of the existing institutions or existing election processes.

The system can build on the existing election cycle and underlying systems and hence introduces a continuous control of the government, parties and representatives. The introduction of such a system could allow a limited lengthening of the election periods, as the influence of the citizens is ensured, but this is not a necessary step.

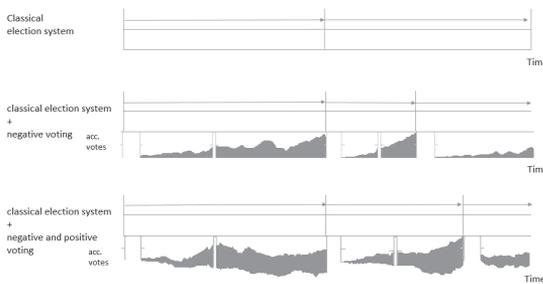
Democratic intervention is a continuous addition to an existing election system, not a replacement. Every voter can vote at any time or on any date, which, during an election period of several years, requires the ability for everyone to change, recast or eliminate a vote at any point in time as often as they like. This process is the only way to reflect a true picture of the opinion of the population. The current standings of the casted votes are continuously accounted for, updated and shown in real-time on a public domain. This procedure of course means that issues related to the protection of the privacy of the vote must be resolved when a democratic intervention system is implemented, but this is the case for any form of internet voting. Nevertheless, one voter does not have an unlimited number of votes, which makes the system more reliable. A single voter has one vote each for the cabinet and the government. For parties, the single voter has votes for 25 percent of the number of parties represented in parliament. For parties this calculation gets rounded up, which means that as soon as there are five parties in parliament every voter receives a second vote. For representatives, the voter receives the number of votes equal to five percent of the number of representatives in parliament. In addition, this calculation gets rounded up. This restriction of votes shall prevent an inflationary use of votes against all unwanted or opposition parties and candidates. The mechanism shall also prevent citizens from casting all their votes one day after the election against all representatives they did not vote for, thus encouraging citizens to leave their votes for the rest of the election period.

3.1. Blocked times and further restrictions

A second limitation of the system is blocked times that are crucial for the success of the democratic intervention system. A new government, cabinet, party or representative needs time to get used to the political day-to-day work and their new responsibilities. This phase is traditionally 100 days, and this tradition should be honored with the negative election system as well. No votes can be cast in this period, which also protects the newly elected from the emotions of Election Day and populist reactions. These 100 days are a generally blocked time, as are days of positive elections and the times between elections and the creation of a new parliament, which means that no votes can be cast in the entire democratic intervention system. However, blocked times also have a second and individual use, which may be even more important than the first one. Individual blocked times arise automatically as soon as a representative or any other entity or person receives too many votes within a narrow time frame. A five percent impact within a period of two weeks could be determined to trigger the blocked period. In such a case, the blocked time prevents voters from casting their votes for that representative or entity for two weeks. This procedure has the objective to limit emotional and populist impacts of single events on the entire democratic system. Both percentage and time have to be subject to discussion in relation to the limits of the particular election. But also from a political point of view is it a critical philosophical discussion to even argue for blocked periods, if the citizens are supposed to have the right to vote at any point in time. For the purpose of this paper we have to argue that the well-being of the system has to be put above the interest of the individual. Populistic and momentary captures of emotions could disrupt the system. Some form of protection mechanism is hence crucial, in order to keep such a system stable, but of course, all limitations have to be regarded critically as they limit the rights of the individual.

Figure 2 shows the three different processes that are discussed in this paper. The second graph exemplifies a hypothetical development with democratic intervention. The third graph was not yet discussed but will be presented after the figure. These graphs are by no means claims of how exactly the process will take place, but are merely graphical illustrations to make the concept easier to understand.

Figure 2: Classical vs. Election system with democratic intervention



Source: Draft by the Authors – as an explanatory sketch

The first draft shows a classical election system, in which the particular party or person is elected in regular periods. The second draft shows a system with a democratic intervention system in place. The blue area exemplifies the hypothetical accumulation of negative votes. The sections in brackets exemplify the blocked times. The broader brackets represent the introduction period of 100 days, and the smaller brackets exemplify the individually blocked periods for the representative, party, cabinet or government depicted in this particular draft. As the graph shows, the democratic intervention system triggers re-elections in draft two. If this were the graph for a single representative, member of cabinet or party there would be no new election, but only an exchange of the particular person or percentage of persons in parliament. The last draft of Figure 2 shows a slightly more complex version of democratic intervention. It shows the possibility that voters could not only cast negative votes but also positive ones in the same quantities as their negative counterparts. These positive votes would be accumulated and accounted for in the same manner as the negative ones. They should be subtracted in real time from the number of negative votes. This process would be one of the purest opinion mechanisms possible within a democracy, as it would truly represent the majorities and wishes of the population. The draft can be understood in the same way as the second one, with the addition that the positive votes spread the distance between the predetermined percentage limit and the usual zero line. Thus, more negative votes would be required to reach the predetermined percentage. This graphical representation was selected to show the impact of the positive votes more clearly. Hence, voters have the right and ability to vote continuously for or against whatever and whoever they like. The political interaction and feedback would thus be fast,

unfiltered and important, as it could end the career of a politician or a government rather quickly. In the case of the positive-democratic intervention system, the predetermined percentage points would have to be adapted to make it possible to reach the required percentage points. A reduction of approximately 10 percent should be enough, but these percentage limitations should be subject to precise and determined discussions before such a system is introduced in any state or entity. This step is important to prevent a factual impossibility for the big parties and their members to hit the predetermined percentage line.

One major risk of the system is of course the always eminent issue of transparency. The recording, analysis and reporting process needs to be transparent, while it has to be accountable and hence secure at the same time. These major issues have to be provided in order to enable such a system successfully. Sadly this paper has not the space nor the engineering focus in order to provide a sensible solution for these hurdles.

The addition of a democratic intervention system to an existing democratic system might also enable a more precise process for referenda, in those countries where they are actually used. This tool of many democracies is discussed, as it is subject to populism and not without criticism. Nevertheless, it is an important tool in many democracies and will remain as such [32]. If the percentage of votes for the issue in question remains above a certain threshold, which could be the same used for the punishment of political parties, for at least two weeks, the referendum is positive and must be respected. The period for the acceptance of the referendum and the necessary percentage must be adapted to the particular democratic needs of the implementing country, as well as the underlying system, as described above. Thus, referenda would not be subject to strong opinions based on news from one particular day, as referenda are far too important to be biased by such short-term impacts. The publicly visible tendencies would also allow the interest groups to engage in further discussions regarding the topic. The documented generational gap at the British “Brexit” referendum [33] could have been narrowed through more intense discussions between the generations. The results that are publicly available with democratic intervention would allow for such a political debate and interaction between groups and interests.

3.2 E-Demarchy

A system like the one proposed here could also be used to be a part of a fundamental change of our election systems. Such a system could enable the continuous control and improvement of a government that is elected through some type of randomization process. The classical Greek cleroterion was such a device. The cleroterion was used to randomize the elected citizens from a number of candidates by pure choice and without the willful influence of a single person or group [34]. Such systems would enable an expert government that

moves politics to the side lines of the governmental process. Proposals for alternative election processes already exist, and there are plenty in history from which we can learn [35]. The proposal in this paper is an additional process, a control mechanism, that can be added to most proposals and more importantly to all existing and employed systems in the democratic world.

4.0 Conclusion

The concept presented here is a profound adaptation to existing systems, based on e-voting technologies. Democratic intervention has many positive and limited negative impacts, if it is strongly regulated, as presented in this paper. A continuous election system with blocked times eliminates the destabilizing impacts that such a system would normally bring. Individually blocked periods can also limit the impact of populist and emotional debates and hence reduce the volatility of the entire system. The limitation of votes for the particular subjects while being able to change, withdraw or re-vote might even lead to a more active engagement of the citizens, as they must decide whom to vote for or against in one particular moment while that perception might change in the next. The ability to have a real impact on the political process with these votes and also a signaling effect to the politicians might be an incentive for a higher level of participation.

The democratic intervention system hence helps to produce a direct feedback mechanism for representatives, parties and the government, while the population gains direct influence on the political process without destabilizing the entire system.

Another positive aspect is that populist tendencies lose power through the actual representation of interests online, as the real percentage of the population that sides with the particular populist approach and the percentage of people who do not agree with that approach can be seen directly online without assumptions or complex estimations. A system of flexible democratic intervention would best represent the will of the people. The tendencies created by the purely democratic intervention would be emphasized even more strongly, and the voter would gain additional influence through increased flexibility and a better feedback loop to politicians. The core target of this first paper on the topic is not to introduce a perfect system but rather to start a discussion about possible adaptations, the possibly increased value added through e-voting and whether such systems are desirable or undesirable for our societies so that we are prepared for the future.

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Bibliography

- [1] Karl R. Popper. *The Open Society and Its Enemies*. London and New York: Routledge Classics; 2011.
- [2] Hansen HR, Mendling J, Neumann G. *Wirtschaftsinformatik*. 11th ed. De Gruyter Studium; 2015.
- [3] Bozóki A, Bring S, Castiglione D, Di Stasi G, Földt B, Follesdal A, et al. Green Paper on "The Future of Democracy in Europe": Trends, analyses and reforms. *Counc Eur Publ*. 2004;
- [4] Perez C. *Technological Revolutions and Financial Capital - The Dynamics of Bubbles and Golden Ages*. Cheltenham, UK: Edward Elgar Publishing Limited; 2002.
- [5] Dahl RA. *Democracy and its critics*. New Haven, London: Yale University Press; 1989.
- [6] Anastasiadis VI. Idealized $\sigma\chi\omicron\lambda\eta$ and disdain for work: aspects of philosophy and politics in ancient democracy. *Class Q [Internet]*. 2004 May 1 [cited 2017 Jan 26];54(1):58–79. Available from: <http://journals.cambridge.org/abstract/S0009838804000047>
- [7] Huntington SP. *The Third Wave. Democratization in the Late Twentieth Century*. Norman: University of Oklahoma Press; 1993.
- [8] Dunn J. *Democracy - A History*. New York: Grove Atlantic; 2005.
- [9] Dahl RA. *On Democracy*. New Haven, London: Yale University Press; 1998.
- [10] Machiavelli N, Walker LJ. *Discourses on the First Decade of Titus Livius*. Penguin Classics; 1984.
- [11] Cancela J, Geys B. Explaining voter turnout: A meta-analysis of national and subnational elections. *Elect Stud*. 2016;42:264–75.
- [12] Blais A. What Affects Voter Turnout. *Annu Rev Polit Sci*. 2006;9:111–25.
- [13] Fromm E. *Der moderne Mensch und seine Zukunft. Eine sozialpsychologische Untersuchung*. Europäische Verlagsanstalt; 1955.
- [14] Pintor RL, Gratschew M. Voter Turnout since 1945. A Global Report. Stockholm: IDEA Institute for Democracy and Electoral Assistance; 2002.
- [15] Artterton C. *Telefocracy: Can Technology Protect Democracy?* Newbury Park, Washington D.C: Sage Publications Incorporate; 1987.
- [16] Grossman LK. *The Electronic Republic: Reshaping Democracy in the Information Age*. New York: Viking Penguin; 1995.
- [17] Haywood T. *Info-Rich / Info-Poor: Access and Exchange in the Global Information Society*. East Grinstead: Bowker-Saur; 1995.
- [18] Mahrer H, Krimmer R. Towards the enhancement of e-democracy: identifying the notion of the "middleman paradox." *Eur Inf Syst J*. 2005;(15):27–42.
- [19] Aström J. Should Democracy Online be Quick, Strong, or Thin? *Commun ACM*. 2001;44:49–51.
- [20] Coleman S. E-democracy: The history and future of an idea. In: Avgerou C, Mansell R, Quah D, Silverstone R, editors. *The Oxford Handbook of Information and Communication Technologies*. Oxford University Press; 2009.
- [21] Hamilton A, Madison J, Jay J. *The Federalist: A Collection of Essays [Online]*. 1788;
- [22] Vargas JA. Obama Raised Half a Billion Online. *Washington Post*. 2008;
- [23] D'Agostino MJ, Schwester RW, Holzer M. Enhancing the prospect for deliberative democracy: The Americaspeaks model. *Innov J Public Sect Innov J*. 2006;(11):1–20.
- [24] Macintosh A. *Characterizing E-Participation in Policy-Making*. HICSS37. Hawaii; 2004.
- [25] Riehm U, Coenen C, Lindner R, Blümel C. *Bürgerbeteiligung durch E-Petitionen: Analysen von Kontinuität und Wandel im Petitionswesen*. edition sigma; 2009.
- [26] Council of Europe. Recommendation CM/Rec(2009)1 of the Committee of Ministers to member states on electronic democracy (e-

- democracy), adopted by the Committee of Ministers on 18 February 2009 at the 1049th meeting of the Ministers' Deputies [Online]. 2009; Available from: http://www.coe.int/t/dgap/democracy/activities/GGIS/CAHDE/2009/RecCM2_009_1_and_Accomp_Docs/Recommendation_CM_Rec_2009_1E_FINAL_PDF.pdf
- [27] Krimmer R, Kripp M. Indicative Guide #1. Electronic Democracy ("e-democracy"); Recommendation CM/Rec (2009) 1 Adopted by the Committee of Ministers of the Council of Europe on 18 February 2009 and Explanatory Memorandum, Counc Eur Ad Hoc Comm E-democracy. 2009;
- [28] E-Voting.cc. Weltkarte Elektronische Wahlen [Internet]. 2017 [cited 2017 Aug 8]. Available from: <https://www.e-voting.cc/en/it-elections/world-map/>
- [29] National Conference of State Legislatures. Recall of State Officials [Internet]. Website of the National Conference of State Legislatures. 2017 [cited 2017 Oct 31]. Available from: <http://www.ncsl.org/research/elections-and-campaigns/recall-of-state-officials.aspx>
- [30] Alvarez RM, Goodrich M, Hall TE, Kiewiet DR, Sled SM. The Complexity of the California Recall Election [Internet]. Vol. 37, PS: Political Science and Politics. American Political Science Association; 2004 [cited 2017 Oct 31]. p. 23–6. Available from: <http://www.jstor.org/stable/4488756>
- [31] The Carter Center. Observing the Venezuela Presidential Recall Referendum [Internet]. Atlanta; 2005 [cited 2017 Nov 14]. Available from: <https://www.cartercenter.org/documents/2020.pdf>
- [32] Suksi M. Bringing in the People - A Comparison of Constitutional Forms and Practices of the Referendum. Dordrecht, Boston, London: Marinus Nijhoff Publishers; 1993.
- [33] Fox S, Pearce S. Survey evidence: the EU referendum had clear positive impact on young people's political engagement. Gallagher M, Uleri PV, editors. LSE Eur Polit Policy. 2016;26(August).
- [34] Buchstein H. Lostrommel und Wahlurne – Losverfahren in der parlamentarischen Demokratie. Zeitschrift für Parlam [Internet]. 2013 [cited 2017 Nov 14];44:384–403. Available from: <http://www.jstor.org/stable/24241665>
- [35] Buchstein H. Demokratie und Lotterie: Das Los als politisches Entscheidungsinstrument von der Antike bis zur EU. campus; 2009.

Appendix (Articles IV-VII)

Article IV

Krimmer, Robert; **Fischer, Dirk-Hinnerk** (2016) "Gedanken zu einem negativen Wahlsystem und der mögliche positive Einfluss", Jusletter IT 25.05.2016 (1.2)

Gedanken zu einem negativen Wahlsystem und dessen möglicher positiver Einfluß (Thoughts on a Negative Election System and Its Possible Positive Influence)

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Deutsche Kurzfassung: Demokratische Wahlen sind über die Jahrzehnte überraschend unverändert geblieben. In diesem Artikel wird eine mögliche Weiterentwicklung des derzeitigen Wahlprozesses angedacht: Ein negatives Wahlsystem. Ein Wahlsystem also in dem die Stimmen negative Auswirkungen für die Gewählten haben. Diese Neuerung fördert die Einbindung der Bürger, die nun durchgängig und relevant wählen können. Der aktuelle Stand dieser kontinuierlichen Wahlen ist zusätzlich von jedem nachvollziehbar. Das vorgeschlagene System wird erst durch technologische Neuerungen ermöglicht und ist so eingegrenzt, dass die Stabilität der Demokratie nicht angetastet wird.

English Abstract: Elections are the heart of democracy. It is thus even more surprising that the election processes have not been changing over the last decades of technological change. This paper proposes a developed election process, a process enabled by modern technologies. One special feature of this process is that a vote accounts negatively for the elected entity or person. The proposed system is a continuous one that gives the population more inside and more influence within the democracy. The voter is able to adapt the votes to the current developments repeatedly, but the structure of the new process is ensuring a stable development for the democracy.

Einleitung

Die Abhaltung von regelmäßigen Wahlen ist ein fundamentales Instrument einer jeden Demokratie. Dabei ist es gleich ob es sich hierbei um eine der antiken, direkten Demokratien oder um die heutigen ‚Standards‘ einer westlichen Demokratie handelt. Wohin sich Demokratien und Wahlsysteme auch entwickeln mögen, Abstimmungen und somit Wahlen werden und müssen essentiell bleiben.

Gleichzeitig können sich viele Menschen unserer Gesellschaft ein Leben ohne elektronische Technik und Vernetzung gar nicht mehr vorstellen. Die technologische Entwicklung der letzten Jahre hat tiefgreifende gesellschaftliche Änderungen geschaffen und das Fortschreiten dieser Prozesse ist wohl nicht mehr aufzuhalten. Nur in wenigen Teilen unserer Gesellschaft sind diese Änderungen noch nicht angekommen. Beispiele hierfür finden sich in Teilen unseres demokratischen Systems. Während sich Handel und Verwaltung schneller an die Neuerungen anpassen, verläuft der Wandel hin zu einer elektronischen Demokratie eher schleppend. Einige kleinere Änderungen wurden durchgesetzt, wie die Nutzung von Zählmaschinen und in einigen Ausnahmelandern sogar das Online-Wählen, aber tiefgreifende reformatorische Ansätze zum Wählen an sich sind bisher kaum umgesetzt.

Dieser Artikel schlägt ein neues Wahlsystem vor, das unsere moderne Demokratie einen großen Schritt weiter, in Richtung der dritten Transformation der Demokratie bringen kann.

Die wichtigste Änderung, die dieses System mit sich bringt ist, dass das System kontinuierlich ist und somit durchgängige Wahlen ermöglicht, ohne die Stabilität der Gesellschaft oder der Position der Abgeordneten zu gefährden. Das Ergebnis dieses Wahlsystems gibt also nicht nur die Laune eines Stichtages wieder, sondern gibt den Politikerinnen und Politikern durchgängiges Feedback zu ihrer Arbeit und der Bevölkerung durchgängigen Einfluss. Die aktuellen Stände der Abstimmungen können online immer aktuell eingesehen werden. Dieser zusätzlich gewonnene direkte Einfluss für die Bevölkerung könnte, als positiver Nebeneffekt, dazu beitragen, die Politikverdrossenheit zu limitieren.

Im Text liegt der Fokus auf nationalen, regionalen und lokalen Wahlen, allerdings kann das hier vorgestellte Wahlsystem auch für internationale Organisationen, Firmen, supranationale Entitäten oder sogar Zentralbanken angewandt werden.

In diesem Artikel stellen wir zuerst kurz die Entwicklung der Demokratie in Zusammenhang mit dem technischen Fortschritt dar. Daraufaufgehend gehen wir dann mehr auf die elektronische Demokratie ein und bereiten somit das Fundament für die Vorstellung des neuen Wahlsystems. Der letzte Teil fasst dann die gesamtgesellschaftlichen Konsequenzen, Möglichkeiten und Risiken des Tools zusammen.

Demokratie

Wie Kofi Annan, der frühere Generalsekretär der Vereinten Nationen, einst sagte: „While democracy must be more than [...] elections, it is also true [...] that it cannot be less.“¹

Dieses Zitat verdeutlicht die Stellung von Wahlen innerhalb einer Demokratie, denn in der Demokratie sind Wahlen das Kernelement der gesellschaftlichen Entscheidungsfindung. Wahlen können jedoch auch zeigen, wie eine Gesellschaft gegenüber Innovation und Technologie eingestellt ist. So wie neue Technologien aufgekommen sind und das Leben der Menschen beeinflusst haben, haben sich auch die Wahlsysteme, Wahlregularien und Wahltechnologien geändert. Technologie und Innovation verändert spätestens seit der ersten industriellen Revolution in regelmäßigen Abständen unsere Gesellschaft, unser Zusammenleben und unsere Auffassung der Welt. (Perez 2002) Obwohl demokratische Strukturen oder wenigstens Teilstrukturen in einigen antiken Hochkulturen zu beobachten waren, wie es zum Beispiel der Fall war in der Indischen Hochkultur, wird der Geburtsort der Demokratie dem alten Athen zugeschrieben. (Dahl, 1989) Hier wurden Kleisthenes Reformen im Jahr 507 vor Christus durchgeführt und revolutionierten somit die Verfassung. (Aristotle, 1935, auch Bleiken, 1995) Von hier aus verbreiteten sich auch ähnliche, direkt demokratische Strukturen wie die des antiken Roms (Held, 2006), die der Wikinger (Lönroth, 1997) oder die der Schweizer Kantone (Head, 1995, Möckli, 1987). All diese Formen der Demokratie waren jedoch logischerweise an den direkten und persönlichen Kontakt zwischen Menschen gebunden und während der demokratische Ursprung wohl in Griechenland liegt, hat die republikanische Form des antiken Roms der aktuellen Umsetzung der Demokratie die Türen geöffnet (Yakobson, 1999). Danach erwuchs die nächste grundlegende Entwicklung der Demokratie erst aus der Entstehung der Nationalstaaten im späten 18ten Jahrhundert. Nun wurden Repräsentanten nötig, um die demokratischen Prozesse überhaupt noch zu ermöglichen, da die Systeme zu groß geworden waren um jedem gleiches Sprachrecht zu ermöglichen. Diese neue und indirekte Form der Demokratie verbreitete sich dann in drei Wellen um den Planeten (Huntington, 1993). Die Demokratie entwickelte sich von den USA und Frankreich bis sie ihre heute weltweit dominante Position unter den Regierungsformen eingenommen hatte (Canfora, 2007, Dunn, 2005). Diese rasante Entwicklung wurde ermöglicht durch das wohl fundamentalste Prinzip der Demokratie, nämlich dass alle Mitglieder der Gesellschaft gleich sind und dass alle das gleiche Recht haben Entscheidungen zu beeinflussen. (Dahl, 1998)

¹ Frei übersetzt: Während Demokratie mehr sein muss als Wahlen, ist es auch wahr, dass sie auch nicht weniger sein kann.

Robert Dahl war es auch der die gerade beschriebenen Entwicklungen der Demokratie als die erste und zweite Transformation der Demokratie klassifizierte (Dahl, 1989). Der weltweite Trend zu geringer Wahlbeteiligung und der rasanten Entwicklung der Informations- und Kommunikationstechnologien (IKT) hat ihn und andere dazu gebracht über eine dritte Welle der Transformation, der Transformation hin zur elektronischen Demokratie nachzudenken.

Denn über all diese Jahre und Länder hinweg ist die Demokratie nicht gleichgeblieben. Sie wurde tiefgreifend und wiederholt reformiert. Verschiedene Theorien versuchen diese breite Entwicklung zu erklären (unter anderen: Beyme, 1994, Fukuyama, 1992, Huntington, 1993, Vanhanen, 1984). Schon Niccolò Machiavelli beschrieb einen Zyklus der versucht zu erklären warum Reformen in jedem System von Nöten sind. Sein Fokus liegt mit der Entwicklung von der Stabilität hin zur Instabilität. Dieser Zyklus ist in verschiedenen Varianten zu beobachten und auch die Demokratie löst einen solchen Zyklus aus. Generell betrachtet kann man den Prozess so zusammenfassen, dass eine distanzierte und ruhige Regierung, in guten Zeiten, zu Ruhe führt. Diese Ruhe kann zur Faulheit oder zum Schleifenlassen von wichtigen Reformen führen. Diese verschleppten Reformen und veralteten Strukturen wiederum können dann zu einer verstärkten Instabilität im System führen. (Machiavelli & Walker 1984) In der Demokratie, der Machiavelli die Tendenz in die Anarchie abzurutschen zertifizierte, hängt dementsprechend viel von der konstanten Herausforderung der Gewählten, durch die politischen Gegner und die Bevölkerung ab. Einen Grad zwischen Heraus-, Unter- und Überforderung zu finden hängt dabei stark vom jeweiligen Wahlsystem und den jeweiligen Wahlformalitäten ab.

Ein negatives Beispiel für den Zyklus, den Machiavelli beschrieb, ist sicherlich die Weimarer Republik. Diese aus einer Krise geborene Demokratie durchlebte neun Reichstagswahlen in nur 14 Jahren. Dieser rapide Regierungswechsel und die sehr schwierigen Mehrheitsverhältnisse ermöglichten es keiner Regierung wirkliche Reformen und somit Stabilität zu schaffen. Ende der 1920er Jahre mehrten sich die Stimmen, die eine Reform des Wahlsystems forderten, doch alle Stimmen, auch die von Reichskanzler von Papen, der noch 1932, als Letzter, versuchte eine solche Reform vorzubringen, scheiterten. (Schanbacher 1982) Das Argument, dass die Turbulenzen der Zeit der Weimarer Republik mit Reformen des Wahlsystems hätten geglättet werden können, ist nicht neu und bis heute nicht ganz von der Hand zu weisen. (Falter 1991) Doch unabhängig von der detaillierten Bedeutung des Wahlsystems in dieser historischen Tragödie kann festgehalten werden, dass das jeweilige Wahlsystem eine essentielle Rolle für die Stabilität, Attraktivität und Reformfähigkeit eines jeden demokratischen Systems spielt.

In den Jahrzehnten seit dem zweiten Weltkrieg hat sich dies bewahrheitet und die Zahl der Demokratien weltweit ist gestiegen. Der Fall der Sowjetunion, als auch der arabische Frühling haben diesen Trend in den letzten Jahrzehnten nochmals unterstrichen.

Der Gegensatz zu dieser Wachstumstendenz der Demokratie ist der Fakt, dass sich alte und junge Demokratien vermehrt mit Fragen der Legitimität auseinandersetzen müssen. Diese Fragen kann in verschiedenen Fassetten wiedergespiegelt werden. Eine Möglichkeit ist die abnehmende Wahlbeteiligung und Wahlzufriedenheit (Ellis et al., 2006, Franklin, 2004), eine Andere ist eine größere Lücke zwischen Bürgern und Repräsentanten und eine dritte Möglichkeit der Manifestierung der Frage nach Legitimität ist eine zunehmende Politikverdrossenheit (Coleman, 2005).

Der beschleunigte technologische Fortschritt nach dem zweiten Weltkrieg war nicht nur an der Entstehung der oben beschriebenen positiven Entwicklungen der Demokratie beteiligt, sondern löste auch intensive Debatten über die Zukunft der Demokratie aus. Fromm (1955) argumentierte, dass Technologie die Möglichkeit hätte, die Gesellschaften aus ihrer fehlenden Fähigkeit allumfassende Entscheidungen (inklusive Entscheidungsfindung) zu treffen, befreien könnte. Die Welle der abnehmenden Wahlbeteiligung die in den 1980er Jahren einsetzte ließ diese Diskussionen wieder erstarken (Pintor and Gratschew, 2002).

Ein erster Vorschlag in dieser Diskussion war die „minipopulus“, eine Gesellschaft bestehend aus bis zu 1.000 Bürgern, die mit der Hilfe von neuen Technologien ihre „minipopulus“ regieren sollten. Der Vorschlag basiert auf der Idee, dass Einsparungen auf jeder Ebene der Regierung vorgenommen werden könnten, um somit eine direktere Demokratie zu erschaffen, da die Bürger von überall her wählen und abstimmen könnten. (Dahl, 1989).

Ein anderer Vorschlag beinhaltet digitale Rathaustreffen, die es den Bürgern in größeren Städten und Gemeinden ermöglichen, an mehr Varianten der Entscheidungsfindung teilzunehmen (Arterton, 1987).

Eine weitere Welle dieser Diskussionen entstand, als sich das Internet am Ende des 20ten Jahrhunderts immer mehr verbreitete. Die vorherrschende Meinung war, dass die revolutionären Entwicklungen in den Bereichen des elektronischen Handels (e-commerce) und der elektronischen Verwaltung (e-governmance) weitere Wellen schlagen würden und auch die demokratischen Prozesse (e-democracy) grundsätzlich ändern würden. Es wurden sogar eine virtuelle Agora und die komplette Transformation zu elektronischen Republiken vorhergesehen. (Grossman, 1995, Rheingold, 1993).

Die Gegenstimmen zu diesen optimistischen Tendenzen befürchteten eine digitale Spaltung der Gesellschaft, weil Zugang und Verständnis der IKT nicht gesellschaftlich gleichverteilt wäre (Haywood, 1995, Golding, 1996).

Elektronische Demokratie

Elektronische Demokratie entwickelt sich nicht ganz so schnell wie andere Bereiche der elektronischen Transformation. Obwohl viele Politikerinnen und Politiker in Initiativen zur elektronischen Verwaltung eingebunden waren oder sind, unterstützen sie die Idee einer elektronischen Demokratie nicht. Dies kann verschiedene Gründe haben, wobei einer der Häufigsten die Angst vor Machtverlust ist (Mahrer and Krimmer, 2005). Im besten Fall könnten sie Bürger direkt und problemlos informieren. Die häufige Zurückhaltung ist allerdings verlustreich, da ein intelligenter Nutzen der IKT helfen könnte eine Gesellschaftsform zu etablieren, die einen kontinuierlichen Dialog zwischen Politikern und Bürgern ermöglicht. Die Vorteile eines solchen Dialoges liegen auf der Hand, da eine Politikerin, die sich sicher ist, dass sie den Willen ihrer Bürger vertritt und ein Bürger, der sich vertreten fühlt, mehr vom System haben als zwei aneinander vorbei lebende Entitäten.

Der negativste Fall, der die Angst von Politikern teilweise erklären kann wäre, wenn die gesamte Macht der Entscheidung direkt an die Bürger übergehen würde, die Online wählend über ihr Schicksal selbst bestimmen könnten. (Aström, 2001) Dies würde offensichtlicher Weise die Existenz von Repräsentanten überflüssig machen. Diese Idee, der absoluten direkten Demokratie, liegt in direkter Opposition zur Beschreibung der Repräsentation von Madison, in welcher er klarstellt, dass man nur die Repräsentanten verantwortlich machen könne, aber nicht die Mehrheit der Bürger (Hamilton et al., 1788), was noch einmal einen Aspekt der langsamen Entwicklung von e-democracy erklären kann, da viele Bürger diese Verantwortung gern abgeben.

Die theoretischen Überlegungen über das Potenzial von IKT die Demokratie zu transformieren folgte ebenfalls in Wellen, die zu unterschiedlichen Zeiten in Europa und den USA stattfanden. Die Website MoveOn.org war die erste Organisation in den USA, die die zukünftige Wichtigkeit des Internets für die Politik erkannte und potentielle Wähler, während der Kampagne von Howard Dean digital kontaktierte. Nur vier Jahre später war das Internet der wichtigste Kanal für die Finanzierung der Kampagne Barack Obamas. Der Hintergrund dafür war, dass in der Zwischenzeit Soziale Netzwerke wie Facebook aufgekommen waren. (Vargas, 2008)

Trotzdem bedeutet die föderalistische Struktur der Verwaltung der USA, dass Organisationen die

nicht der Regierung angehören, wie AmericaSpeaks.org, die Mehrheit der elektronischen Plattformen und Wege der elektronischen Interaktion zwischen Repräsentanten und Wählern bereitstellen müssen (D'Agostino et al., 2006).

In Europa ist es anders: Da politische Parteien Zugang zu öffentlichen Finanzen haben, muss das Internet noch an Einfluss auf den Wahlprozess gewinnen. Viele Regierungen sehen IKT als Medium für elektronische Petitionsplattformen, wie die des schottischen Parlaments (Macintosh, 2004) oder wie die des deutschen Bundestages (Riehm et al., 2009). Abgesehen hiervon hat elektronische Demokratie noch nicht sehr viel Unterstützung von den nationalen Regierungen bekommen. Somit könnten internationale Organisationen wie der Rat der Europäischen Union eine wichtige Rolle in der Entwicklung und Förderung von Angelegenheiten der elektronischen Demokratie spielen. Der Rat der EU folgte einem Bericht einer Expertenrunde der vielseitige Modernisierungsideen vorschlug (Bozóki et al., 2004) und erschuf 2005 eine ad-hoc Arbeitsgruppe, die ermitteln sollte, wie elektronische Demokratie aussehen könnte und Verbesserungsvorschläge für die Mitgliedsstaaten entwerfen sollte. Diese Arbeitsgruppe definierte elektronische Demokratie als: „the support and enhancement of democracy, democratic institutions and democratic processes by means of ICT“² (Council of Europe, 2009). Als Teil dieser Empfehlungen wurden von der Arbeitsgruppe 33 Methoden und Richtlinien vorgestellt, die auf den Vorschlägen der Mitgliedsstaaten basierten (Krimmer and Kripp, 2009). Im Jahr 2012 führte die Europäische Union ihr erstes transnationales elektronisches Demokratiekonzept ein, indem die Europäische Bürgerinitiative gestartet wurde. (Kaufmann, 2012).

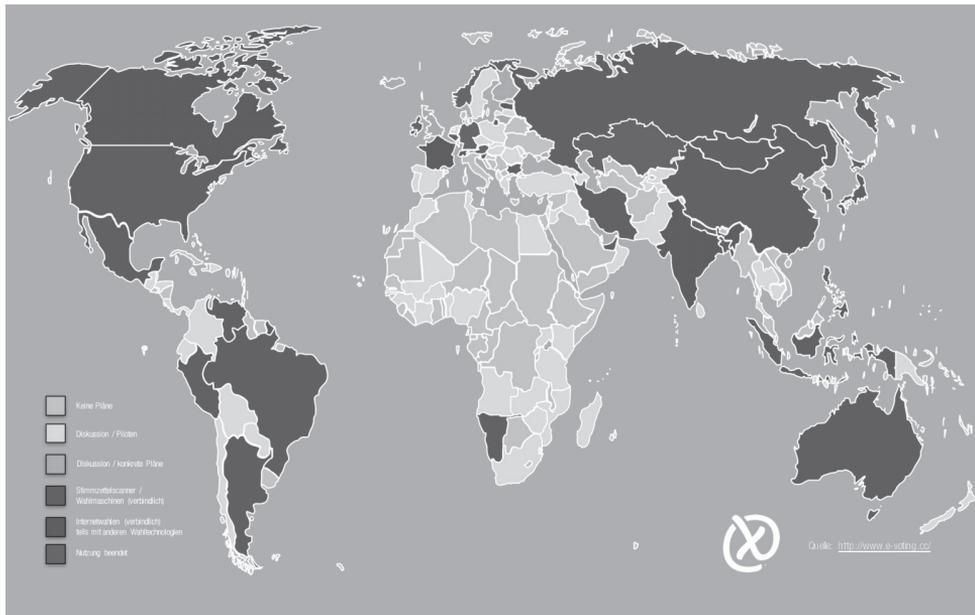
Das Konzept der Demokratie hat sich seit seiner Erschaffung sehr gewandelt und wandelt sich noch immer. Somit ist der wachsende Einfluss von IKT auf die Demokratie nicht überraschend, aber wie gesagt hängt die Entwicklung hier noch etwas hinter den Entwicklungen von elektronischem Handel und elektronischer Verwaltung her. Länder, die das Potenzial von elektronischer Demokratie voll auskosten wollen, sollten eine ganzheitliche Diskussion anstoßen und Politiker davon überzeugen, dass IKT ihnen helfen kann, die empfundene Distanz zwischen ihnen und ihren Wählern zu verkleinern oder gar zu schließen.

Zum Höhepunkt des E-Commerce Booms ordnete der damaligen Präsidenten der Vereinigten Staaten, Bill Clinton, eine Untersuchung der Möglichkeiten der elektronischen Wahlen im Dezember 1999 an. Dies löste ein Rennen aus, welches Land als erstes Internetwahlen flächendeckend einführen würde. Doch im Gegensatz zu den meisten technologischen Entwicklungen, waren es nicht die USA, die dieses Rennen ‚gewannen‘, sondern ein kleines ehemaliges Mitglied der Sowjetunion, im Norden Europas. Estland führte als erste Nation Kommunalwahlen in 2005 bzw. Parlamentswahlen in 2007 über das Internet durch (für eine nähere Behandlung der Anfänge, siehe Drechsler and Madise, 2004, sowie der allgemeinen Entwicklungsschritte, siehe Vinkel, 2015).

Außer Estland bieten noch Länder wie Frankreich oder die Schweiz insbesondere Auslandsbürgern, die Möglichkeit über das Internet die Stimme abzugeben. Die Entwicklung ist jedoch nicht uniform, so beendeten die Niederlande 2007 bzw. das Vereinigte Königreich 2008 ihre Versuche mit Internetwahlen. Für einen Überblick des aktuellen Status siehe auch Darstellung 1.

² Freie Übersetzung: die Unterstützung und Entwicklung der Demokratie, demokratischer Institutionen und demokratischer Prozesse mit der Hilfe von IKT.

Darstellung 1: Weltkarte zum Status von Elektronischen Wahlen



Quelle: (E-Voting.CC, 2015)

In diesem Artikel wird eine Möglichkeit vorgeschlagen, wie Wahlen näher am Bürger sein könnten und wie Abgeordnete ein besseres, unmittelbares und realistischeres Feedback erhalten könnten, ohne dass dabei mehr Arbeit anfällt und ohne dass damit die Stabilität des Systems gefährdet wird.

Negative Wahlen und ihre Möglichkeiten

Eine veränderte Gesellschaft benötigt veränderte demokratische Möglichkeiten. Wenn elektronische öffentliche Verwaltung eine „Gesellschaft der Mitarbeit“ ermöglichen soll, dann ist ein verändertes Wahlsystem ein unausweichlicher Schritt um den Bürgern genügend Anreiz zur Mitarbeit zu geben. Der Einfluss der Bürger muss sichtbar und eindeutig sein, damit der Anreiz zur Partizipation groß genug ist.

IKT ermöglicht ein nie dagewesenes Level an demokratischer Partizipation, da die räumlichen Distanzen und Öffnungszeiten keine Rolle mehr spielen und somit eine durchgängige Partizipation ermöglicht ist. Zudem unterliegt die Einmischung der breiten Bevölkerung keinem Verzug mehr und kann somit die Politik sofort beeinflussen. Das bedeutet, dass interaktive Wahlsysteme angebracht

wären, wenn eine Gesellschaft wahrlich zu einer elektronischen Demokratie werden wollen würde. Dies bedeutet allerdings nicht, dass das Wahlsystem zwingend schneller gemacht werden muss. Kurze Wahlperioden vermindern die Anreize für die Entscheidenden sich langfristig zu orientieren, da es ihnen, als Berufspolitiker, zumeist um ihre Wiederwahl gehen muss. Wenn diese Wiederwahl allerdings schon zwei Jahre nach der Erstwahl ist, wird die Perspektive, was in fünf Jahren sein wird, wenig zählen. Zudem würde ihnen einfach die Zeit fehlen wirkliche Reformen anzupacken. Was wiederum nahelegt, dass in einem solchen System sehr wenige wirkliche und tiefe Reformen durchgeführt werden würden. Ein solches System wäre sicherlich von der Realisierung von Wahlgeschenken dominiert oder würde nie wirklich zur Ruhe kommen.

Lange Wahlperioden auf der anderen Seite führen dazu, dass die Regierenden zu wenig Anreiz haben, wirklich etwas zu leisten, da ihre Macht für die Periode gesichert ist. Erst gegen Ende der Periode könnten wieder mehr Reformen durchgeführt werden, wenn dies die aktuelle wirtschaftliche Lage erzwingen würde. Ein solches System wäre also, rein von den Anreizen für die Entscheidenden her, sehr langsam und träge. Es würde zudem dem von Machiavelli beschriebenen Kreislauf zur Instabilität unterliegen.

Ein extremes Beispiel veranschaulicht diese Aussagen. In einem Land ist die Wahlperiode nur zwei Tage während im Nachbarland die Wahlperiode zehn Jahre ist. Das erste Land würde in einem durchgängigen Rennen um Wählerstimmen stillstehen, während es im Anderen schwer wäre noch eine Demokratie zu erkennen. Lange Wahlperioden schließen die Bevölkerung zu stark aus dem demokratischen Prozess aus. Kurze Wahlintervalle minimieren die Wichtigkeit der einzelnen Wahl so, dass die Wahlbeteiligung auf Dauer deutlich sinken würde und zudem würde diese enorme Flexibilität des Systems die Politik nur mehr zum Subjekt der momentanen politischen, vielleicht populistisch aufgeladenen Stimmung machen. Ein Beispiel hierfür wäre die Weimarer Republik, in welcher die Regierungen nie die Zeit hatten, die vielen Splittermeinungen zu einen und überhaupt die echten Herausforderungen des Moments anzugehen. Beide Systeme sind dementsprechend nicht zielführend für eine starke und einbindende demokratische Regierung.

Eine dritte und durch die Technologie ermöglichte Art des Wählens wären negative Wahlen die auf kontinuierlichen Weise durchgeführt werden. Diese Kontinuität respektiert allerdings die nötigen Stabilitätsfaktoren, die das System nachhaltig machen.

Ein negatives Wahlsystem funktioniert, wie der Titel impliziert genau andersherum als alle herkömmlichen Wahlprozesse. Obwohl der Anfang gleich ist: jede Stimme, die für einen Abgeordneten, eine Abgeordnete, eine Partei oder Regierung abgegeben wurde wird kumuliert verrechnet. Die abgegebenen Stimmen werden also über den Lauf der Zeit zusammengerechnet und in Echtzeit ausgewertet. Die Anzahl der Stimmen für bestimmte Politikerinnen und Politiker, Parteien oder die Regierung selbst können also durchgängig eingesehen oder mit Zeitlinien und statistischen Tools ausgewertet werden. Wenn diese Anzahl der Stimmen den vorgegebenen Prozentsatz der Stimmen, zum Beispiel 50% der Wahlberechtigten erreicht, ist die oder der Abgeordnete, das Kabinett oder eben einfach die Entität in Frage abgewählt. Dies bedeutet, dass wenn eine Regierung diesen Prozentsatz erreicht neu gewählt werden muss. Wenn eine Partei abgewählt ist, werden der Partei 50% ihrer Sitze gestrichen und unter den anderen gewählten Parteien verteilt. Ein abgewähltes Kabinett bedeutet, dass nur das Kabinett neu besetzt werden muss. Einzelne Ministerinnen und Minister, Regierungsleiterinnen und -leiter und ebenso Abgeordnete verlieren ihren jeweiligen Sitz und Nachrücker werden zu neuen Mitgliedern des Parlaments.

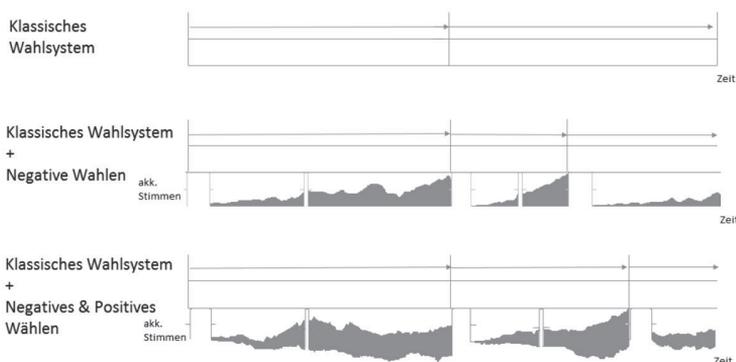
Das hier beschriebene System kann neben den normalen Wahlperioden eingeführt werden und somit eine durchgängige Kontrolle der Arbeit der Regierung, Parteien und Abgeordneten einführen. Die Einführung eines solchen Systems würde es ermöglichen, die generelle Wahlperiode etwas zu verlängern, da die demokratische Kontrolle sowieso gegeben ist, allerdings muss das nicht passieren.

Das negative Wahlsystem ist, wie man sich denken kann, ein kontinuierliches System, das jeder und jedem Wahlberechtigten ermöglicht zu jeder Tages- und Nachtzeit zu wählen. Damit das System wirklich fähig ist die Meinung der Gesamtbevölkerung widerzuspiegeln, müssen alle Wahlberechtigten das Recht haben so oft zu wählen oder zurückzuziehen, wie sie es wünschen. Was bedeutet, dass jeder die Stimme zurückziehen und wiedervergeben kann sooft dies eben individuell gewollt ist. Der Stand der abgegebenen Stimmen wird kontinuierlich erhoben, daher stellt ein solches Verhalten absolut kein Problem dar. Wahlberechtigte haben allerdings nicht unbeschränkte Mengen an Stimmen, um das System verlässlicher zu gestalten. Wahlberechtigte haben je eine Stimme für die Abwahl des Kabinetts oder der gesamten Regierung. Für Parteien haben die Wahlberechtigten so viele Stimmen, dass sie einem Prozentsatz von 25% der Anzahl der Parteien, die im Parlament vertreten sind entsprechen. Hierbei wird allerdings aufgerundet, was bedeutet, dass sobald 25% mehr als eine Partei ist, die Wahlberechtigten zwei Stimmen erhalten. Sobald also fünf Parteien im Parlament vertreten sind erhalten die Wahlberechtigten zwei Stimmen für Parteien. Für das Abwählen von Abgeordneten zählt die Regel, dass der Wähler 5% Stimmen für die Anzahl der Abgeordneten im Parlament erhält. Auch hier wird aufgerundet. Diese Limitierungen der Stimmen sollen einen inflationären Gebrauch der Stimmen gegen alle ungeliebten Parteien und Abgeordnete verhindern und die Stabilität des Systems erhöhen. Diese Limitierung soll auch verhindern, dass BürgerInnen schon am ersten Tag der Wahl gegen alle stimmen, die sie nicht gewählt haben und es dann den Rest der Wahlperiode so belassen.

Eine zweite Limitierung sind Sperrzeiten, die auch essentiell für den Erfolg des Systems sind. Eine neue Regierung, neue Abgeordnete und Parteien brauchen eine Gewöhnungsphase im politischen Alltag um sich einleben zu können. Diese Phase von 100 Tagen schützt die Gewählten vor den Emotionen des Wahltages und verhindert zu schnelle und populistische Reaktionen. Sperrzeiten haben allerdings noch einen zweiten Nutzen, da sie eingreifen, wenn eine Entität zu viele Stimmen in kürzester Zeit kumuliert oder verliert. Diese Sperrzeiten treten in Kraft, wenn innerhalb von zwei Wochen fünf Prozentpunkte dazu oder verloren worden sind. In einem solchen Fall sperren die Phasen die Stimmenabgabe für oder gegen die jeweilige Entität oder Person für zwei Wochen. Im Normalfall sollten sich die Gemüter in dieser Zeit beruhigt haben und somit den populistischen Einfluss des Moments minimieren.

Figur 1 veranschaulicht die drei verschiedenen Prozesse, die in diesem Artikel diskutiert werden. Der zweite Graph veranschaulicht eine exemplarische Entwicklung unter Einbeziehung der negativen Wahlen. Der unterste Prozess wurde noch nicht vorgestellt, greift aber nur wenige Zeilen vor.

Darstellung 1: Gegenüberstellung Klassisches / Negatives Wahlsystem



Quelle: Skizze der Autoren

Das oberste Balkensystem beschreibt ein klassisches Wahlsystem, in dem die jeweiligen Parteien oder Personen in regelmäßigen Perioden gewählt werden.

Das zweite Balkenkonstrukt veranschaulicht den Aufbaumechanismus des negativen Wählens. Die blaue Fläche stellt hierbei die Akkumulation der negativen Stimmen dar. Die ausgeklammerten Bereiche sind die Sperrzeiten. Die breiteren Klammern sind die Einführungsphasen, von 100 Tagen und die kürzeren Sperrbereiche sind die Schwankungsbremsen, von zwei Wochen, die größere Sprünge ausbremsen. Wie zu sehen ist, werden im Fall des zweiten Graphen einmal Neuwahlen ausgelöst.

Das unterste Schaubild zeigt die komplexere Version des negativen Wählens. Die Möglichkeit, dass die Wahlberechtigten nicht nur negativ Stimmen, sondern auch positive Stimmen für besonders gute Arbeit vergeben können. Diese positiven Stimmen wären genauso beschränkt wie die negativen Stimmen, die oben beschrieben worden sind. Dieser Prozess wäre die höchste Schule der Demokratie, da es wahre Mehrheiten widerspiegeln würde.

Im gleichen Zug könnten die Wähler in durchgängigem Prozess negativ Stimmen gegen Entitäten, die sie nicht für fähig halten, abgeben und positiv Stimmen für solche, die sie für besonders fähig halten. Die positiven Stimmen würden ebenfalls einfach kumuliert werden und die Ausgangslinie der jeweiligen Entität oder Person verschieben und somit eine Abwahl unwahrscheinlicher machen. Um die Akkumulation allerdings besser darzustellen, wäre es empfehlenswert, dass die negativ und positiv Stimmen nicht einfach gegengerechnet werden würden, sondern jeweils kumuliert werden und dann, wie in Darstellung 1, die Basis jeweils in ihre Richtung verschieben würden. Diese Darstellung, egal ob graphisch oder numerisch, würde ein besseres Verständnis und eine bessere Vergleichbarkeit zwischen den verschiedenen Entitäten und ihrer öffentlich empfundenen Arbeit wiedergeben.

Im Fall des positiv-negativ Wahlsystems müssen die zu erreichenden Prozentsätze aber natürlich nach unten korrigiert werden um ein Erreichen überhaupt zu ermöglichen. Eine Senkung um etwa 10 Prozentpunkte der Schwelle sollte ausreichen muss allerdings je nach Fall und zu wählender Entität entschieden werden. Dies ist essentiell um nicht den großen Parteien und ihren Mitgliedern von Anfang an einen großen Vorteil zukommen zu lassen.

Zusammenfassung

Der hier vorgestellte Vorschlag ist keine komplette Revolution des bisherigen Wahlsystems, als vielmehr eine Adaption. Negatives Wählen, in der wie hier präsentierten reglementierten Form hat viele positive und limitiert die negativen Aspekte die ein kontinuierliches Wahlsystem mit sich bringt. Die destabilisierenden Effekte von Wahlen, die in zu kurzen Zeitabständen gehalten werden, wurden klar gezeigt, doch die eingeführten Pufferzeiten verhindern eine größere Einflussmöglichkeit für populistische Tendenzen und limitieren spontane Schwankungen. Die Limitierung der Anzahl der individuellen Stimmen führt zudem dazu, dass sich engagierte Bürgerinnen und Bürger um entscheiden müssen, wenn sie zu vielen Entitäten ihre Stimme gegeben haben.

Insgesamt trägt das System der negativen Wahlen, aber zu einem unmittelbaren Feedbackprozess für die Abgeordneten, Parteien und Regierenden bei, während es der Bevölkerung deutlich mehr unmittelbaren Einfluss gibt und auch hier den Menschen zeigt, wo sie in der Gesellschaft stehen und ob Ihre Meinung tatsächlich einer größeren Mehrheit entspricht oder ob sie sich nur in einer Splittergruppe befinden. Dieser Feedbackprozess sollte also zusätzlich positiven Einfluss auf die Minimierung von Populismus haben.

Das System des kontinuierlichen negativ und positiv Wählens würde die hier beschriebenen Einflüsse zusätzlich noch einmal verstärken. Die Tendenzen die das negative Wählen schafft würden noch einmal unterstrichen werden und dem Bürger würde durch mehr Flexibilität mehr Einfluss gegeben.

Als letzten Punkt kann man noch sagen, dass der Informationsgehalt der Darstellungen der Wahlen noch größer wäre mit diesem System.

All diese Faktoren führen dazu, dass das mit elektronischen Wahlen leicht durchzuführende negative Wahlsystem eine positive Entwicklung für jede Demokratie wäre.

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Quellen

- ARISTOTLE 1935. *The Athenian Constitution*, Cambridge, Harvard University Press.
- ARTERTON, C. 1987. *Teledemocracy: Can Technology Protect Democracy?*, Newbury Park, Washington D.C., Sage Publications.
- ASTRÖM, J. 2001. Should Democracy Online be Quick, Strong, or Thin? *Communications of the ACM*, 44, 49-51.
- BEYME, K. V. 1994. *Systemwechsel in Osteuropa*, Frankfurt am Main, Suhrkamp.
- BLEIKEN, J. 1995. *Die athenische Demokratie*, UTB.
- BOZÓKI, A., BRING, S., CASTIGLIONE, D., DI STASI, G., FÄLDT, B., FOLLESDAL, A., GAXIE, D., GROSS, A., LLOYD, A., LOWNDES, V., BONNICI, U. M., NANZ, P., PRATCHETT, L., RITCHIE, C., SCHMITTER, P. C., TRECHSEL, A. H. & WIELOWIEYSKI, A. 2004. *Green Paper on "The Future of Democracy in Europe": Trends, analyses and reforms*, Strassbourg, Council of Europe Publishing.
- CANFORA, L. 2007. *Eine kurze Geschichte der Demokratie*, Cologne, PapyRossa.
- COLEMAN, S. 2005. *Direct Representation*. London: IPPR.
- COUNCIL OF EUROPE. 2009. *Recommendation CM/Rec(2009)1 of the Committee of Ministers to member states on electronic democracy (e-democracy), adopted by the Committee of Ministers on 18 February 2009 at the 1049th meeting of the Ministers' Deputies* [Online]. Verfügbar unter: http://www.coe.int/t/dgap/democracy/activities/GGIS/CAHDE/2009/RecCM2009_1_and_Acomp_Docs/Recommendation_CM_Rec_2009_1E_FINAL_PDF.pdf.

- D'AGOSTINO, M. J., SCHWESTER, R. W. & HOLZER, M. 2006. Enhancing the prospect for deliberative democracy: The Americaspeaks model. *The Innovation Journal: The Public Sector Innovation Journal*, 11, 1-20.
- DAHL, R. A. 1989. *Democracy and its critics*, New Haven, London, Yale University Press.
- DAHL, R. A. 1998. *On Democracy*, New Haven, London, Yale University Press.
- DRECHSLER, W. & MADISE, Ü. 2004. Electronic Voting in Estonia. In: KERSTING, N. & BALDERSHEIM, H. (eds.) *Electronic Voting and Democracy: A Comparative Analysis*. London: Palgrave.
- DUNN, J. 2005. *Democracy - A History*, New York, Grove Atlantic.
- E-VOTING.CC 2015. Weltkarte Elektronische Wahlen.
- ELLIS, A., GRATSCHEW, M., PAMMETT, J. H., THIESSEN, E., BALINOV, I., BURGESS, S. W., CHRABOLOWSKY, L., MCGRANE, D., HOCMAN, J., LEMÓN, K. & OMEKCO, S. 2006. *Engaging the Electorate: Initiatives to Promote Voter Turnout from Around the World*, Stockholm, International IDEA.
- FALTER, J., 1991. *Hitlers Wähler* C. H. B. Verlagsbuchhandlung, München.
- FRANKLIN, M. N. 2004. *Voter Turnout and The Dynamics of Electoral Competition in Established Democracies Since 1945*, Cambridge, Press Syndicate of the University of Cambridge.
- FUKUYAMA, F. 1992. *The End of History and the Last Man*, Free Press.
- GOLDING, P. 1996. World Wide Wedge: Division and Contradiction in the Global Information Infrastructure. *Monthly Review*, 48, 70-85.
- GROSSMAN, L. K. 1995. *The Electronic Republic: Reshaping Democracy in the Information Age*, New York, Viking Penguin.
- HAMILTON, A., MADISON, J. & JAY, J. 1788. *The Federalist: A Collection of Essays* [Online]. Verfügbar unter: <http://thomas.loc.gov/home/histdox/fedpapers.html>.
- HAYWOOD, T. 1995. *Info-Rich / Info-Poor: Access and Exchange in the Global Information Society*, East Grinstead, Bowker-Saur.
- HEAD, R. C. 1995. *Early Modern Democracy in the Grisons*, Cambridge, Cambridge University Press.
- HELD, D. 2006. *Models of Democracy*, Cambridge, Malden, Polity Press.
- HUNTINGTON, S. P. 1993. *The Third Wave. Democratization in the Late Twentieth Century*, Norman, University of Oklahoma Press.
- KAUFMANN, B. 2012. *The European Citizens' Initiative - Pocket Guide* [Online]. Brussels: Green European Foundation. Verfügbar unter: http://gef.eu/uploads/media/The_European_Citizens_Initiative_Pocket_Guide.pdf.
- KRIMMER, R. & KRIPP, M. 2009. *Indicative Guide #1. Electronic Democracy ("e-democracy")*: Recommendation CM/Rec (2009) 1 Adopted by the Committee of Ministers of the Council of Europe on 18 February 2009 and Explanatory Memorandum, Council of Europe. Ad Hoc Committee on E-democracy.
- LÖNNROTH, L. 1997. The Vikings in History and Legend. In: SAWYER, P. (ed.) *The Oxford Illustrated History of the Vikings*. Oxford, New York: Oxford University Press.
- MACINTOSH, A. 2004. Characterizing E-Participation in Policy-Making. *HICSS37*. Hawaii.
- MACHIAVELLI, N. & WALKER, L.J., 1984. *Discourses on the First Decade of Titus Livius* B. Crick, ed., Penguin Classics.
- MAHRER, H. & KRIMMER, R. 2005. Towards the enhancement of e-democracy: identifying the notion of the 'middleman paradox'. *European Information Systems Journal*, 15, 27-42.
- MÖCKLI, S. 1987. *Die schweizerische Landsgemeinde-Demokratien*, Bern, Haupt.
- PEREZ, C., 2002. *Technological Revolutions and Financial Capital - The Dynamics of Bubbles and Golden Ages*, Cheltenham, UK: Edward Elgar Publishing Limited.
- PINTOR, R. L. & GRATSCHEW, M. 2002. *Voter Turnout since 1945. A Global Report*. Stockholm: IDEA Institute for Democracy and Electoral Assistance.
- RHEINGOLD, H. 1993. *The Virtual Community*, Reading, Addison-Wesley.

- RIEHM, U., COENEN, C., LINDNER, R. & BLÜMEL, C. 2009. *Bürgerbeteiligung durch E-Petitionen: Analysen von Kontinuität und Wandel im Petitionswesen*, edition sigma.
- SCHANBACHER, E., 1982. *Parlamentarische Wahlen und Wahlsystem in der Weimarer Republik* Beiträge z., Düsseldorf: Droste Verlag
- VANHANEN, T. 1984. *The emergence of democracy : a comparative study of 119 states, 1850 - 1979*, Helsinki, Finnish Soc. of Sciences and Letters.
- VARGAS, J. A. 2008. Obama Raised Half a Billion Online. *Washington Post*.
- VINKEL, P. 2015. *Remote Electronic Voting in Estonia: Legality, Impact and Confidence*. PhD, Tallinn University of Technology.
- YAKOBSON, A. 1999. *Elections and Electioneering in Rome. A Study in the Political System of the Late Republic*, Stuttgart, Franz Steiner Verlag.

Article V

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Making a Mark—Time Changing Politics from Estonia: An Alternative Idea for the British, Bulgarian and Estonian EU Presidency

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Abstract: *Estonia is famous among politicians for its e-Governance policies. One core ingredient for this progress is the abolishment of outdated technologies and standards as this kind of legacy policy slows down the innovation process. This short paper adapts the Estonian approach towards legacy policy and proposes a political symbol initiated by the EU Presidency Trio of the United Kingdom, Bulgaria and Estonia. The entire topic was inspired by the motivation of the Estonian government to use the presidency to make a mark for Estonia. The twice-yearly occurring process of introducing and disabling the summertime, is not only annoying but has also almost exclusively negative impacts. Meanwhile, the summertime itself comes with many aspects of questionable impact and even opposing empirical results, but it also has some generally agreed upon positive influences. This paper takes side against the process of changing times, but does not take position for one of the possible solutions. This short article shall only inform and show the possibilities in regard to the summer time, the EU presidency and the political symbolism of celebrating the centenary of the First World War.*

Keywords: *Council of the EU, daylight saving time, integration policy, summertime, Trio Presidency*

1. Introduction

The observation of an unnecessary and overcome policy and the political willingness to put Estonia on the international map are the two issues driving this paper, but these issues are also driving the Estonian politics. Thus the paper does not approach one of the big issues of our time but rather a custom to which we have all become so used to that we do not even question its purpose any more.

One question could elaborate the objective of this research: Who, in a modern world, benefits from the changing of the clocks?

The twice-yearly repetition of changing clocks is still in place in about 70 countries in the world. Many countries such as China, Russia, Argentina or India, and thus the governments of the majority of people on earth, have distanced themselves from this policy. In other big countries like Australia, Brazil, the U.S. or Canada, there are no regulations implementing the law on national level rather than some states change the time and others do not.

The Member States of the European Union are the biggest number of conclusively organized countries who have adopted the summertime. In general, the summertime is a Western tradition that has already surpassed its peak of influence. Most of the rest of the world is not changing to summertime.

The first step in this paper is to take a look at the historical background of the process. The second step is to go into greater detail on the international discussion regarding the summertime. The third step will be to investigate the pros and cons of the process for companies, private persons and governments.

As this paper is written from an Estonian perspective, a brief summary of the abolishment of the summertime that failed in Estonia before the country joined the European Union is due. It is also necessary to mention the differences between the attempt back then and the proposed jurisdiction. Many things have changed since then and Estonia is not only going to be the EU Council's President in early 2018, but is becoming more and more known worldwide as one of the decisive players for e-Governance issues. Both of these things, the Council presidency and e-Governance, are elite projects which in many countries do not really penetrate the masses. The Trio has been shown to be a good method to improve the continuance of the political process (Raik, 2015), but to achieve this continuance, a tri-state cooperation needs a determined program and objective for their cumulated terms of presidency. The proposed political debate would help all three states to make a mark on the map of the average European citizen,

which would especially be important for Bulgaria and Estonia, as the UK should already be well known to most European citizens.

The purpose of the paper is to offer an additional alternative to how Estonia and its Government might use the EU presidency to establish themselves as more than capable innovators and administrators.

Some might say that with all the IT we got nowadays we should not bother with such structural things that are widely solved by software. The argument against this is easy and clear as legacy policy is no longer of interest to our society and, secondly, every report on business problems related to the changing of the clocks are evidence enough to abolish the process of changing time.

The time zones are also going to be analyzed, since some progressive thinkers are already questioning their efficiency and the issue needs to be mentioned in an analysis of the modern time system.

This paper will argue in favour of an international coordination mechanism instead of a radical change within the system.

It is important to mention that in neither topic an asynchronous solution could and should be an option as European countries are too intertwined to disagree on such an important issue. Estonia already tried to take a time changing step alone once and had to learn from that experience. The objective should thus be a synchronous abolishment or year-round introduction of the summertime. The entire action might and could be marketed as a political symbol for a more peaceful, interconnected and opened “new” Europe and European Union, especially in times of growing extremism and political pressure.

2. Historical development

The concept of a summertime is not one of the last century, but it was first introduced and used in the early 20th century. The main argument in those days and until today has been to save energy. Reportedly, the Ben Franklin was the first who articulated the idea as businesses would save a lot of money for candles if the opening hours would be more coinciding with the daylight (Kotchen & Grant, 2008).

The summertime was first introduced into common law in the early 20th century by Germany during the First World War. The German Reich under Wilhelm

It introduced it on the 1st of May 1916. The policy was adopted by most participating countries during the war. Afterwards some countries kept it in use while others abolished it (Reincke & van den Broek, 1999). The U.S., for example, introduced it in 1917 and repealed it again in August 1919 (Kamstra, Kramer & Levi, 2000).

Throughout the century, countries changed the implementation with quite impressive flexibility. Only a few countries show consistency in the usage of the summertime. Summarizing the main patterns shows that the summertime was introduced during periods of crisis, such as the Second World War or the oil crisis. Presumably because the myth of saving energy with the help of the changing time was kept alive for a long time. Some countries, like the United Kingdom, even experimented with double summertime and year-round summertime. However, from March 1968 to October 1971, a trial was concluded with the notion that it would be impossible to quantify results and thus no position for or against was taken (Aries & Newsham, 2008).

In 1980, the European Council began harmonizing the process among its Member States as the periods of introduction and even the usage itself have been highly diversified before that (Reincke & van den Broek, 1999). This synchronization process continued and, in 2000, the European Council passed a directive to implement unified summertime arrangements, with additional later applications to new Member States (EC, 2001).

Estonia attempted to abolish the summertime more than ten years ago and was not successful as the public opinion turned quickly against the new law. The main reasons for the paradigm shift were that the international communication and trade suffered, and also a shorter sunny evening in the summer was not seen as favourable. Scientifically interesting is that the energy savings were and have not been worth mentioning (Gunter, 2002). The change also happened under the Reform Party's leadership, which is in power in 2015 and still will be in 2018 at the time of Estonia's Council presidency.

It is also worth mentioning that in 2000 also Latvia changed to not using the summertime any more, but only a year later they reintroduced it as a way of bringing more sunlight to the Latvians (BNS, 2001). Modern Bulgaria introduced the summertime in 1997 and adapted it to the European norms (ICF, 2014; FOCUS, 2015).

Thus, out of the trio, the British and the Estonian government have past experiences and data on the public reaction among their people, but the times have changed and a single-handed abolishment is off the table. So now these

governments are able to implement change in Europe on an international scale. But for a successful introduction of this process the three countries will be needing international partners. The opinions present in other European regions will be briefly summarized in the next subsection.

3. International discussion

In general, and in almost all European countries, the summertime is a topic that has not eluded criticism. This mixture of results can also be found in the research, as very controversial findings have been published over the last decades.

The first and oldest argument for the summertime was that of energy saving. In past times this was most probably true but there is no conclusive proof for it in modern times. Changed living and housing habits, air-conditioning and the mass usage of information and communication technologies (ICT) have eliminated or might even have reversed the energy saving effects (Aries & Newsham, 2008). There is no conclusive proof for any savings at all. This accounts especially if the over-proportional economic and growth of population are taken into account. These tendencies come along with drastically changed living standards and consumption habits in most European regions over the last one hundred years (Fischer, 2015).

Kamstra, Kramer and Levi (2000) have shown that the summertime can even have a negative influence on the stock exchanges and that it implies averaged losses year by year. Finance is not the only sector impacted in a negative way. The agricultural sector is also subject to different negative impacts, among these, for example, the disturbed biological rhythm of farm animals like cows and a darker working day for farmers (Reincke & van den Broek, 1999).

The discussion about the purpose of the changing process is not only a European one. For example, not all states of the U.S. actually have the summertime, or daylight saving time as they call it. A commission in California found in 2001 that at most 0.5 per cent of energy might be saved if anything at all. (Kandel & Metz, 2001)

A more recent experimental study (Kotchen & Grant, 2008) finds that the policy actually results in an increase in residential electricity demand of about 1 per cent. The most impacting factor here is the increase in consumption after the fall transition. The difference occurs due to the increase in heating and air conditioning. (Kotchen & Grant, 2008) This experimental study was conducted

in Indiana, U.S.A., and as such conducted at a comparable latitude to Spain, Italy or Greece.

Other studies carried out in the U.S., such as a study under Governor Arnold Schwarzenegger from the California Energy Commission in 2007, shows inconclusive energy saving results (Kandel & Sheridan, 2007).

On the European level, an extensive study has been conducted for the Commission on the efficiency of the summertime (ICF, 2014). The study found very little proof to an impact on energy, as the technological and organizational advances made in the last decades have eliminated this effect. (ICF, 2014) The former possible ways to save energy have been annihilated by many aspects, one of which is most certainly the increased usage of air-conditioning (Kotchen & Grant, 2008). It can thus be concluded that the energy saving argument is no longer justified. Maybe it has been valid in the past, but modern living conditions and habits are different than those a hundred years ago.

The impact of the summertime on leisure and tourism is reportedly a positive one, which is not against all odds as the summer evenings are getting longer with the summertime (ICF, 2014). Even though modern working structures and more flexible organizations are limiting this impact to a certain extent, it still remains a fact that has to be considered.

Researchers from Chile have found that the changes in official times have an impact on the carbon oxide concentration in cities, which lowers the average quality of the air, but there is no long-term influence due to the second changing of time in fall. (Muñoz & Schmitz, 2007)

Health problems have been reported in Germany and also the number of notification of sickness absences from work has been increased year by year by almost 15 per cent after the introduction of the summertime (DAK, 2015).

Another argument regarding an increased security due to more sunlight in the evening hours has found support in a not very recent study from 1995 showing that the daylight saving time actually saves lives within the U.S., as less pedestrians are hit by cars in the twilight (Ferguson *et al.*, 1995). Another study from 1983 actually finds the opposite (Hicks, Lindseth & Hawkins, 1983).

A more recent study found that workplace-related accidents increase after the switch. Meanwhile, the second part of the study using another database and shorter time periods does not find this correlation. (Barnes & Wagner, 2009)

The only conclusive finding seems to be that the number of accidents with deer after the spring change is shown to be exponentially increasing in comparison to normal accident rate (Haikonen & Summala, 2001).

In the economic sphere, the real costs are very hard to estimate and nobody has actually done it so far, as the calculation is extremely complicated. The use of ICT is smoothing the process a lot for all of us, but still some transition costs remain. These costs are not only limited to the time lost adapting to the changing, but also occur within the ICT sector itself. (ICF, 2014) And despite all our technological improvements confusion remains among all kinds of entities and humans. For example, the Minister of Bavaria missed a call by German Chancellor Angela Merkel in 2014 due to the changing to the summertime (DPA, 2014). Humans stay humans and they may forget things. This missed call is most certainly not one of the reasons why the governing German Party of Angela Merkel (CDU or Christian-Democratic Union / Christlich Demokratische Union) decided to take a stand against the summertime in Europe. The CDU accepted the abolishment of the summertime as an official position in the program of the party (FAZ, 2014). A more important reason for this step might be that more than two-thirds of all Germans speak out against this twice-yearly repetition of the old and presumably unnecessary habit (forsa, 2015).

In France the situation is a little different as 27.4 per cent of people are indifferent and 38.8 per cent are against the current system of changing the clock. The interesting thing is that they even have an organization the objective of which is to lobby against the summertime (ACHdE, 2015).

Already since 1978, Switzerland has been in open opposition to the summertime as a public referendum rejected the policy, but due to complications in trade, tourism, finance and transport, the Parliament had to adapt the official time in Switzerland to the official time in its neighbouring countries. Switzerland, even though not a member of the EU, would thus be happy to join a world without the summertime (Schwander, 2013).

Russia, another neighbour of the EU, abolished the summertime in 2011 to limit the negative health impacts (ICF, 2014).

One of the most complete studies on the topic has been conducted in Turkey, where different scenarios of implementation have been discussed (Karasu, 2010). In the end, the government did not meet the suggestions, but the findings show once again the difficulty of measurement within this topic. It has also shown that, at the most, limited energy savings can be expected. (Karasu, 2010)

The British government is running analyses every year and has found that the summertime on average saves around 80 lives and prevents 212 serious injuries each year. These studies also show that the process of turning the clocks back has a negative impact on these very positive statistics as the number of accidents increases significantly in autumn. (RoSPA, 2014)

The German government is currently running a study on the effects and results of the summertime. The results are expected late in the year 2015. This study will most probably determine the German position in the upcoming years. If this study finds in favour of the abolishment, Estonian politicians should seriously consider using their upcoming EU presidency for a greater good.

It is obvious that every European country, regardless its geographic position, cultural heritage and political system, has different perceptions about and connections to the summertime. It is thus challenging to find a unified approach, but a general critique of the current system is widely present. The difficulty within the project is that Europe is not a small country, but rather subject to very different climates and sunlight conditions. It is just rational that the opinions are different, as empirical findings are not conclusive either and there are only tendencies observable. In general the summertime seems to have some upsides but actually no real downside. On the other hand, the process of changing the time has almost exclusively negative effects on animals, humans and the society. Two ways of responding to this mixture of indicators are thinkable: introducing the summertime year round or returning to the standard time year round.

If we now think about a common market and a further European and worldwide integration, we have to see that the summertime is only one of the problems as the time zones also have their confusing impacts.

Some solutions have been proposed for this issue. One of the more creative approaches was introduced by Swatch, the Swiss watch manufacturing company which proposed a single time system called the Swatch Internet Time. This might be a solution for the future with a more integrated and ever more global or even space connected society. The system works with 1,000 beats that are not bound to time zones or other barriers but are always and everywhere the same. One beat consists of 86.4 seconds and is counted beginning from zero at midnight and ends with a thousand on the next midnight. Swatch also introduced a new Meridian through their headquarters in Switzerland. The idea behind this concept was that the Internet is universal and does not need time zones. (Lee & Whitley, 2002; Lee & Liebenau, 2000)

Information can spread around the world within a blink of an eye. This new transportation velocity makes different time zones not only unnecessary but also confusing. Every one of us is used to having daylight at the middle of the counted time for every day, at least in Estonia for the longest part of the year. This habit will most probably stay like this during the upcoming decades and it is also not yet necessary to be changed, at least not on a large scale. The positive thing is that there is no need to eliminate the global solution in order to continue with the regional solutions.

The system proposed by Swatch might be considered slightly too complicated as it takes one unnecessary step and only adapts the already existing system of an absolute time system. The already existing system would be the Coordinated Universal Time (UTC). The UTC is a simpler system that is already used in nautical and aviation terms. The term UTC first appeared in the early 1960s and has been in use ever since. (Arias & Guinot, 2004) In both of these really international trades, the UTC has proven itself to be an effective system. As the nautical system is already in use, why not emphasize the adaption of this proven addition? The system is simple as it only takes the Greenwich Time and uses it as a standard for the world. Everybody has seen it somewhere. It is present, but just not yet official.

In the context of the European Union, this time measurement could be introduced as an official time, so that meetings and schedules would not get mixed up by internationally travelling people. This time measurement is already in standard use for many people in international trade and most internationally working people are already aware of it, so why hesitate using it for official communication and introducing a double standard in public life.

A unified time would not matter too much to the public if it is introduced as a second official time, which means that it would co-exist with the local time. This co-existence would mean that the UTC can be used as a general standard for official matters.

Time zones themselves are a rather young concept, as they were introduced with the nautical standard time in the 1920s (Howse, 1980). The system is thus even younger than modern nations. And still both systems develop with an increase in the average travel intensity and travel speed. Neither nations nor time zones are a final concept in human history. Higher interaction led to bigger countries and faster travel made problems with unregulated time zones obvious. This process is very unlikely to stop in our current situation as average travel speed and international interaction are still very much developing. Both systems are

continuously changed all over the world. Time changes have been mentioned, as Russia eliminated two time zones in 2011 and stopped changing the clocks while running on daylight saving time. In 2014, the Russian Duma again changed the time to the “original” winter time, as reportedly the doubled daylight saving time had caused a significant impact on public health (Stulov, 2014).

Also, many countries, even in Europe, struggle between separation and integration tendencies and issues. Countries including Turkey, Spain, UK or Ghana have been recently featured in the media in relation to these topics.

For thousands of years there has been no clock or time measurement at all. Time has been a construction of humanity and it is not a natural thing. But time has been always related to natural phenomena such as the orbiting of the sun. With that the local time changed from region to region depending on the point in time when the sun was at its highest position. One of the first mechanical timepieces was invented in 1657, which was way more accurate than water, sundial and other time counting mechanisms at that time. Before that, time could only be counted with a loss of accuracy of about 15 minutes per day. Within a few years, the new technologies enabled an accuracy loss of less than 10 seconds per day. The 1657 invention also led to the appearance of minutes and seconds on clocks. The consciousness of people for the existence of minutes and seconds emerged only afterwards. (Lee & Liebenau, 2000) Technical development has thus changed the perception of time throughout history.

The concept of time zones was needed when global trade increased and the technological background had been developed, so that most travelling people were carrying a watch. Travel, trade, long-distance communication and general international communication increased and made the use of every particular local solar time obsolete. This can be exemplified by the U.S. in the 1870s when different railroads used multiple calculations and had thus different times for the same place. This system made travellers confront very practical problems, as the departure times differed significantly. Further problems, such as an increased number of train crashes through different time calculations, underlined the need for a new system. The system of time zones was introduced only in 1884 at the International Meridian Conference with a participation of 25 nations (Palmer, 2002).

The elimination of time zones would not be very practicable nowadays for those regions not close to the line of coinciding 12 o'clock and the highest point of the sun would be troubled as their sunlight time would shift from day to night and customs had to be changed, which is just not necessary and practicable. But to introduce an official communication time that would be used by all transport

sectors would help to minimize the communicational errors and save time as well as be a political symbol not only for Europe but for the entire world for better communication and closer relations.

4. An attempt to put Estonia on the map

Estonian politics often focuses on the possibility to increase the international recognition of this small Baltic country. Putting Estonia on the map is not only the focus of the political or business elites, but also of the citizens. Nevertheless, most projects by the Estonian government and administration are elite projects, such as “paper free presidency”. These projects are great technological steps and they set political marks, but the average person hears little about it, as it does not really impact their lives.

The EU presidency itself is a political and academic expert project and most people on the street do not even know which country currently holds the presidency or through which mechanisms it is distributed.

The point is that political Estonia will put itself in a highly favourable position if the administrative processes, soft and hard skills are well prepared for a smooth presidency, which is very likely as the administration is already working intensively on these preparations now. The first major official step in this direction has been successfully taken as Estonia will work with a Brussels-based presidency which is preferred by most partner countries as it smoothens the processes. Thus, Estonia will most probably not fail to leave a good impression on the European partners, but most of the general public will probably hear very little about the presidency. Nevertheless, the presidency gives an opportunity to make a mark, also one that sticks with the broad masses. This is a time in which a small group of countries can develop the European Union by initiating a beautiful political symbol.

This step can draw wide public attention to innovative projects, like the e-Residency, which is being developed in Estonia right now. It can also attract attention to earlier innovations, which have become routine in Estonia, but are still far in the future in most parts of Europe like e-ID, e-Voting and, especially, the e-Signature.

The recent political crisis has created a little more awareness about the existence of the country, but the international reports still mostly focus on security rather than attracting interest in the country.

Estonian officials have to face a decision towards the approach of making a mark in Europe. Following a strict top-down interest creation approach is opposed to a more integrative multi-level approach. The current position of a top-down approach, by focusing on technological and administrative elites is a good start, but it does not really attract tourist attention.

Now Estonia can make a mark not only for a more peaceful future, but also against pointless or outdated bureaucracy. The elimination of legacy policy is a fundamental pillar of the technological development plan of the Estonian government. The political symbol proposed here would draw attention on a bigger scale. It would also stand for a peaceful long-term integration, also with our neighbouring countries.

One last point has to be mentioned and that is a topic that many technologically affine people are probably already thinking about. It is clear that modern technology is no longer challenged by the issue of changing to and from summertime, but some transaction costs have been briefly mentioned. Another negative aspect is that natural beings are impacted and challenged by the time-changing processes. The last aspect against the argument follows an Estonian way of argumentation and in the spirit of eliminating legacy policy—just because most programs no longer have a problem adapting does not mean that outdated standards should be kept.

5. Summary and possible platforms

In general, there are two ways to abolish summertime. Either Europe takes an easy step and returns to the “official” time or it adopts summertime as the new “official” year-round time. Within Europe, the latter is probably the preferred option as most people like to sleep in and would enjoy their evenings with an hour of longer sunlight, but it would move Europe’s time zones one hour further to the west. Most probably, this procedure also would not harm the image of Europe in the world, but it might require some adaptation time internationally. An easier way would be a return to the “wintertime”.

Even though a tendency toward summertime exists, the decision is one mostly based on feelings and not one based on facts, as the advantages of summertime over wintertime are already mostly and will probably be completely equalized by more flexible working conditions and a more efficient energy system. The important conclusion is that the process of changing clocks will be abolished.

The second conclusion of this paper is that the EU should not hesitate to introduce an official double standard in time as an officially introduced UTC would help to smoothen the international processes in the entire EU.

This paper claims that the process of changing to summertime and the poor communication of international time are the two small issues that could be tackled within the Trio Presidency of Estonia, UK and Bulgaria. The proposed changes would simplify and improve international communication for the population, companies and governments. Implementing one of the two ideas into European law would already be a major step, while the changing process should enjoy higher priority as it has measureable effects on the wider population and it also attracts more public interest. The analysis made it obvious that an international approach is the only way that makes sense, as national solutions have triggered numerous problems in the past. The two discussed issues are not too important, yet significant enough to the entire European population so that these modifications could help to put Estonia on the map of the broad population.

The celebration of the passing of hundred years from the end of the First World War, dated to 18 October 2018, falls within the period of Bulgaria's presidency. So if a jurisdiction would be signed on that day it would be a signal not only within Europe, but internationally. For Estonia to share the glory with the traditionally EU-critical British and the emerging Bulgarians could make this symbol even more powerful. The success of such an attempt seems highly probable as important European and international political powers would be supporting the endeavour.

Much of the process obviously depends on the referendum in the UK. But for the purpose of this paper it is assumed that the economic, social and Scottish interests will prevail and that the UK will stay in the European Union.

David Cameron made visits to several European countries this year proclaiming a new, reformed and more adapted European Union. The symbolic reform proposed here should thus fit in the program of his government. It is a tiny step and its implementation could be organized without any greater impact on business or social life by the centenary of the end of the First World War.

Another result of a rejected exit-referendum would be that British politicians would also have an incentive to set a political symbol for a more adapted and less bureaucratic European future. The presidency is already too short to allow entrance to high politics, such "minor" issues would thus be a good way to make a mark and to further the European idea with less hurdles.

From an Estonian viewpoint, sharing the glory of the idea would emphasize the purpose of the symbolic elimination of legacy policy on an international level, which would show other European governments how Estonia became so well developed in ICT and leave a lasting impression on international administrators.

To return to the question of who would benefit from the changing of the clocks, asked at the beginning of the paper: it is the people who are not involved in an accident due to the summertime and those enjoying longer summer evenings. The process of changing the clocks on the other hand benefits nobody. It disturbs and harms animals as well as humans. Impacts on the economy are not conclusive. In no area was there a conclusive positive finding for the changing process itself. Increased accidents and disturbed biorhythms are only two of the negative aspects. The differentiation between the process of changing and the different time systems should always be kept in mind, if such topic is being discussed. The summertime has its advantages, while the process of changing has not.

Thus, the essential point for this paper is that the Estonian government and its two partner countries should use the presidency to set a symbol for further development and a less bureaucratic future. A symbol 100 years after the end of the essential catastrophe of the 20th century. A symbol for a more peaceful and connected 21st century, during which Europe learned from its past mistakes. A symbol easily set by introducing one official time and abolishing the processes of changing the clock, whether to the summertime around the year or to the standard time.

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References

- ACHdE (2015), *Site D'information de l'Association Contre L'heure D'été Double, Pour La Réduction Des Avancements de L'heure Légale (France)*, Association Contre L'heure D'ete Double. Retrieved from <http://heure-ete.net/argumentaire.htm> [accessed Dec 2015]
- Arias, E. F. & Guinot, B.** (2004), 'Coordinated Universal Time UTC: Historical Background and Perspectives,' *Proceedings of the Journées Systèmes de Référence Spatio-Temporels*, Observatoire de Paris, 20–22 September 2004, pp. 254–259.
- Aries, M. B.C. & Newsham, G. R.** (2008), 'Effect of daylight saving time on lighting energy use: a literature review,' *Energy Policy*, vol. 36, no. 6, pp. 1858–1866. <http://dx.doi.org/10.1016/j.enpol.2007.05.021>
- Barnes, C. M. & Wagner, D. T.** (2009), 'Changing to daylight saving time cuts into sleep and increase workplace injuries,' *Journal of Applied Psychology*, vol. 94, no. 5, pp. 1305–1317. <http://dx.doi.org/10.1037/a0015320>
- BNS (2001), 'Latvia to switch back to summer time,' *The Baltic Times*. Retrieved from <http://www.baltictimes.com/news/articles/4055/> [accessed Dec 2015]
- DAK (2015), *Umfrage Zur Zeitumstellung / DAK-Gesundheit*. Website of the DAK. Retrieved from http://www.dak.de/dak/bundesweite_themen/Umfrage_zur_Zeitumstellung-1588766.html [accessed Dec 2015]
- DPA (2014), 'Wegen Zeitumstellung: Seehofer verschläft Merkel-Telefonat,' *Handelsblatt*, 4 April 2014. Retrieved from <http://www.handelsblatt.com/politik/deutschland/wegen-zeitumstellung-seehofer-verschlaeft-merkel-telefonat/9717140.html> [accessed Dec 2015]
- EC (2001), Directive 2000/84/EC of the European Parliament and of the Council of 19 January 2001 on summer-time arrangements, *Official Journal of the European Union*, L 031, 02.02.2001.
- FAZ (2014), 'Parteitagsbeschluss: CDU will die Sommerzeit abschaffen,' *Frankfurter Allgemeine Zeitung*, 5 April 2014. Retrieved from <http://www.faz.net/aktuell/politik/inland/parteitagsbeschluss-cdu-will-die-sommerzeit-abschaffen-12882140.html> [accessed Dec 2015]
- Ferguson, S. A.; Preusser, D. F.; Lund, A. K.; Zador, P. L. & Ulmer, R. G.** (1995), 'Daylight saving time and motor vehicle crashes: the reduction in pedestrian and vehicle occupant fatalities,' *American Journal of Public Health*, vol. 85, no. 1, pp. 92–96. <http://dx.doi.org/10.2105/AJPH.85.1.92>

- Fischer, D.-H.** (2015), 'A Comparison of the Economic Situation of Tyrol, Austria in Three Key Periods: 1908–1913, 1945–1950 and 2008–2013,' *Baltic Journal of European Studies*, vol. 5, no. 1, pp. 93–108. <http://dx.doi.org/10.1515/bjes-2015-0007>
- FOCUS (2015), 'Bulgaria adopts daylight saving time,' *Focus News Agency*. Retrieved from <http://focus-fen.net/news/2015/03/29/367810/bulgaria-adopts-daylight-saving-time.html> [accessed Dec 2015]
- forsa (2015), *Meinungen Zur Zeitumstellung*, Cologne: forsa Gesellschaft für Sozialforschung und statistische Analysen mbH.
- Gunter, A.** (2002), 'Summer time returns to two Baltic states,' *The Baltic Times*, 4 April 2002. Retrieved from <http://www.baltictimes.com/news/articles/6212/> [accessed Dec 2015]
- Haikonen, H. & Summala, H.** (2001), 'Deer-vehicle crashes: extensive peak at 1 hour after sunset,' *American Journal of Preventive Medicine*, vol. 21, no. 3, pp. 209–213. [http://dx.doi.org/10.1016/S0749-3797\(01\)00352-X](http://dx.doi.org/10.1016/S0749-3797(01)00352-X)
- Hicks, R. A.; Lindseth, K. & Hawkins, J.** (1983), 'Daylight saving-time changes increase traffic accidents,' *Perceptual and Motor Skills*, vol. 56, pp. 64–66. <http://dx.doi.org/10.2466/pms.1983.56.1.64>
- Howse, D.** (1980), *Greenwich Time and the Discovery of Longitude*, 1st ed., Oxford & New York: Oxford University Press.
- ICF (2014), *The Application of Summertime in Europe*. A report to the European Commission Directorate-General for Mobility and Transport (DG Move), ICF International, 19 September 2014.
- Kamstra, M. J.; Kramer, L. A. & Levi, M. D.** (2000), 'Losing sleep at the market: the daylight-savings anomaly,' *American Economic Review*, vol. 12, no. 3, pp. 1000–1005.
- Kandel, A. & Metz, D.** (2001), *Effects of Daylight Saving Time on California Electricity Use*: California Energy Commission Staff Report, 23 May 2001.
- Kandel, A. & Sheridan, M.** (2007), *The Effect of Early Daylight Saving Time on California Electricity Consumption: A Statistical Analysis*, California Energy Commission Staff Report, May 2007.
- Karasu, S.** (2010), 'The effect of daylight saving time options on electricity consumption of Turkey,' *Energy*, vol. 35, no. 9, pp. 3773–3782. <http://dx.doi.org/10.1016/j.energy.2010.05.027>
- Kotchen, M. J. & Grant, L. E.** (2008), 'Does daylight saving time save energy? Evidence from a natural experiment in Indiana,' *Review of Economics and Statistics*, vol. 93, no. 4, pp. 1172–1185. http://dx.doi.org/10.1162/REST_a_00131
- Lee, H. & Liebenau, J.** (2000), 'Time and the Internet at the turn of the millennium,' *Time & Society*, vol. 9, no. 1, pp. 43–56. <http://dx.doi.org/2000/03;9;1;43-56>
- Lee, H. & Whitley, E. A.** (2002), "Time and information technology: temporal impacts on individuals, organizations, and society," *The Information Society*, vol. 18,

- pp. 235–240. <http://dx.doi.org/10.1080/01972240290075084>
- Muñoz, R. C. & Schmitz, R.** (2007), ‘Morning peak of air pollutant concentrations in urban areas: Effect of time lag between emissions and turbulence,’ 7th AMS Symposium on the Urban Environment, 10–13 September 2007, San Diego, California, USA.
- Palmer, A. W.** (2002), ‘Negotiation and resistance in global networks: The 1884 International Meridian Conference,’ *Mass Communication and Society*, vol. 5, no. 1, pp. 7–24. <http://dx.doi.org/10.1207/S15327825MCS0501>
- Raik, E.** (2015), “The ‘Trio Presidency’ of the Council of the European Union: Towards more continuity?” *Baltic Journal of European Studies*, vol. 5, no. 1, pp. 19–35. <http://dx.doi.org/10.1515/bjes-2015-0003>
- Reincke, K.-J. & van den Broek, F.** (1999), *Summer Time: Thorough Examination of the Implications of Summer-Time Arrangements in the Member States of the European Union*, Executive Summary. Leiden: Research voor Beleid International.
- RoSPA (2014), *British Summertime Fact Sheet*, The Royal Society for the Prevention of Accidents.
- Schwander, P.** (2013), ‘Farbe Bekennen – Energie Sparen,’ in S. Hirsbrunner, M. Buchs & M. Zünd (eds.), *Energieetikette*, 2nd ed., Bern: Bundesamt für Energie - Swiss Federal Office of Energy.
- Stulov, M.** (2014), ‘Russia to switch to permanent winter time,’ *The Moscow Times*, 1 July 2014. Retrieved from <http://www.themoscowtimes.com/news/article/russia-to-switch-to-permanent-winter-time/502808.html> [accessed Dec 2015]

Article VI

Krimmer, Robert, **Fischer, Dirk-Hinnerk**, and Schmidt, Carsten. 2017. "Bürgerkonten und das Projekt "The Once-Only Principle"". *Public Governance* 4 (1.2)

Bürgerkonten und das Projekt „The Once-Only Principle“

Die Digitalisierung schreitet stetig voran. Sie hat inzwischen alle Teile der Gesellschaft erfasst, insbesondere Bürger und Unternehmen. Die öffentliche Verwaltung sowohl auf europäischer als auch auf nationaler Ebene unterstützt diese Entwicklung durch vielfältige Maßnahmen. Hierzu gehören sowohl gesetzliche Vorgaben und die Standardisierung von Übermittlungsformaten als auch die Förderung von und die Beteiligung an entsprechenden Projekten. Das auf dem Once-Only-Prinzip basierende Projekt TOOP¹ und die Bereitstellung von Bürgerkonten sind zwei herausragende Maßnahmen aus diesen Bereichen.

Das Once-Only-Prinzip

Um den Bürokratieabbau durch grenzüberschreitende Verwaltungsnetzwerke zu ermöglichen, hat die EU-Kommission das Once-Only-Prinzip (OOP) als Grundsatz der einmaligen Erfassung im Rahmen des E-Government-Aktionsplans 2016–2020² formuliert. Dies bedeutet, Daten – unter Einhaltung der jeweiligen Gesetze und Rahmenbedingungen – lediglich einmalig (engl. „once only“) zu erheben und dann für alle weiteren Zwecke zu (ver-)teilen. Hierbei stehen verschiedene Möglichkeiten des Informationsaustauschs im Fokus. Diese beziehen sich sowohl auf den Datenaustausch zwischen den jeweiligen Verwaltungseinrichtungen (G2G³) als auch auf die Kommunikation der Verwaltung mit Unternehmen (G2B⁴) und Bürgern (G2C⁵). Das Prinzip fußt auf dem politischen Ziel, die wirtschaftliche Schlagkraft der Europäischen Union durch Initiativen wie den Aufbau des „Digital Single Market“ zu stärken. Dem OOP liegt die Annahme zugrunde, dass die Sammlung von Informationen kostenintensiver ist als das Teilen und Übertragen von bereits gesammelten Informationen.

Die politische Realität in Europa steht aktuell jedoch einer zeitnahen und reibungslosen Umsetzung von OOP entgegen: Es herrschen unterschiedliche Interpretationen des Prinzips und es gibt verschiedene Ansätze zur Umsetzung von staatlichen Dienstleistungen. Auf technischer Ebene erschweren die differierenden Informationssysteme einen Datenaustausch, während auf juristischer Ebene die verschiedenen Auffassungen von regulativen Einschränkungen (Datenschutzgesetze) dem Projekt entgegenstehen. Eine EU-weite (einheitliche) Umsetzung von OOP ohne rechtliche Änderungen auf EU-Ebene erscheint daher kaum denkbar. Bis entsprechende EU-Regelungen, die zurzeit noch in Vorbereitung sind, geschaffen werden, kann das OOP rechtlich wohl vorerst nur auf den nationalen Ebenen umgesetzt werden.

Die Umsetzung des Once-Only-Prinzips geht einher mit dem geplanten Aufbau des „Single Digital Gateway“ – auch zentrales digitales Zugangstor genannt. Hiermit sollen künftig Unternehmen und Bürger über einen zentralen digitalen Zugang EU-weit auf Verwaltungsverfahren, Informationen und Servicedienstleistungen zugreifen können. Dazu beabsichtigt die EU-Kommission gemeinsam mit den Mitgliedstaaten, einen Onlinezugang zu den wichtigsten und am häufigsten genutzten Verfahren einzurichten. Über die Platt-

form sollen nationale und grenzüberschreitende Onlinedienste in mindestens zwei Sprachen angeboten werden, die Unternehmen und Bürger direkt von dieser aus einleiten können. Am 2.5.2017 hat die EU-Kommission einen Vorschlag für eine entsprechende Verordnung vorgelegt.⁶

Die Europäische Union bemüht sich parallel, hierzu weitere rechtliche Grundlagen für die Nutzung des Once-Only-Prinzips zu schaffen. Einen Ansatz bietet zum Beispiel die Europäische Datenschutz-Grundverordnung (DSGVO)⁷. In Artikel 20 der Verordnung wird Personen das Recht eingeräumt, ihre personenbezogenen Daten⁸ (zum Beispiel Name, Kennnummer etc.), die sie einem Verantwortlichen⁹ (zum Beispiel Behörde, Einrichtung etc.) bereitgestellt haben, in einem strukturierten, gängigen, maschinenlesbaren und interoperablen Format zu erhalten und einem anderen Verantwortlichen zu übermitteln. Der ursprüngliche Inhaber der Daten kann die Verantwortlichen dazu auffordern, interoperable Formate zu entwickeln, die die Datenübertragbarkeit

1 The Once-Only-Principle Project (TOOP): www.toop.eu

2 E-Government-Aktionsplan 2016–2020, Grundsatz der einmaligen Erfassung (COM/2016/0179 final), Grundsatz Nr. 2 (S. 4)

3 Government to Government (G2G)-Kommunikation

4 Government to Business (G2B)-Kommunikation

5 Government to Citizen (G2C)-Kommunikation

6 Vorschlag für eine Verordnung über die Einrichtung eines zentralen digitalen Zugangstors zu Informationen, Verfahren, Hilfs- und Problemlösungsdiensten vom 2.5.2017, COM(2017) 256 final

7 Verordnung (EU) 2016/679 zum Schutz natürlicher Personen bei der Verarbeitung personenbezogener Daten, zum freien Datenverkehr (Datenschutz-Grundverordnung)

8 Artikel 4, Nr. 1, Datenschutz-Grundverordnung

9 Artikel 4, Nr. 7, Datenschutz-Grundverordnung

ermöglichen. Des Weiteren hat sich die Europäische Kommission im Rahmen des E-Government-Aktionsplans verpflichtet, das Once-Only-Prinzip auf europäischer Ebene und insbesondere in der ganzen Union weiter voranzutreiben.¹⁰

Aus dem Prinzip OOP folgt das Projekt TOOP

Aufgrund der besonderen Bedeutung des Once-Only-Prinzips für die Wirtschaft und Gesellschaft haben die EU-Kommission und die EU-Mitgliedstaaten am 1.1.2017 das Projekt TOOP („The Once-Only Principle“) gestartet, das auf einen Zeitraum von 30 Monaten angelegt ist. Aufgabe des TOOP-Projekts ist es, die Umsetzung der oben dargestellten Ziele voranzutreiben. Dies geschieht vorrangig mittels mehrerer erweiterbarer und langfristig betreibbarer Pilotverfahren unter Nutzung einer föderalen IT-Architektur. Dadurch wird die länderübergreifende Zusammenarbeit auf EU-Ebene ermöglicht. Der Schwerpunkt liegt hierbei auf der Kommu-

nikation zwischen Behörden und Unternehmen bzw. der Behörden untereinander. Die Kommunikation zwischen Behörden und Privatpersonen wird im Rahmen des TOOP-Projekts nicht berücksichtigt. Des Weiteren sollen Treiber und Hindernisse identifiziert werden, um festzustellen, welche künftig für die breite Implementierung sowie bei der Reglementierung zu berücksichtigen sind.

Das Projektkonsortium im Rahmen von TOOP umfasst 51 Organisationen – aus 19 EU-Staaten sowie zwei europäischen Ländern außerhalb dieses Verbunds – und plant, 60 Informationssysteme über Grenzen hinweg zu vernetzen. Deutschland beteiligt sich mit einem sogenannten nationalen Konsortium, das aus dem Bundesverwaltungsamt, der Metropolregion-Rhein-Neckar und der Universität Koblenz-Landau besteht.

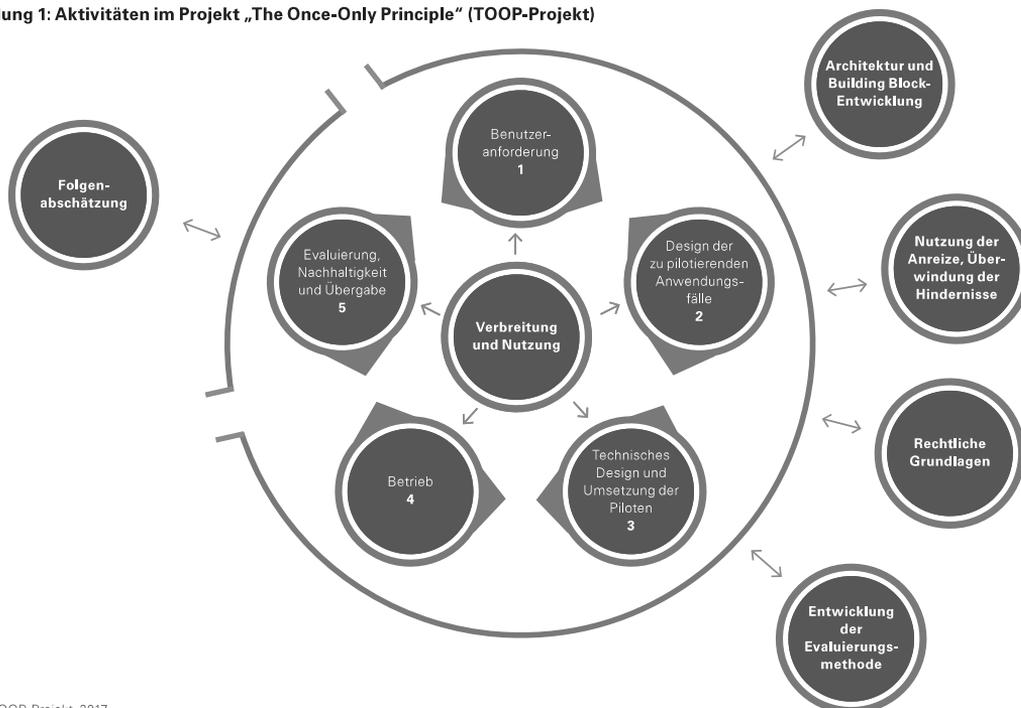
Das Hauptziel von TOOP liegt in der Erprobung und Untersuchung der Umsetzbarkeit des Once-Only-Prinzips. Hierfür gilt es eine Reihe von Subzielen zu erreichen:

1. Die Entwicklung einer föderalen IT-Architektur zur Vernetzung von 60 Informationssystemen in den teilnehmenden Staaten steht im Zentrum der Anstrengungen.
2. Die Nutzung und Erprobung der IT-Architektur im Rahmen von Pilotprojekten in drei Themengebieten für die Dauer von mindestens zwölf Monaten unter realen Bedingungen:
 - a. Länderübergreifende E-Dienstleistungen, insbesondere Ausschreibungen;
 - b. Aktualisierung von länderübergreifenden Daten in Firmenbüchern¹¹; und
 - c. Online-Schiffs- und -Crewzertifikate.
3. Durchführung einer Evaluierung der Pilotprojekte sowie Identifizierung von Treibern und Hindernissen für das OOP, um die weitere Nutzbarmachung zu ermöglichen.

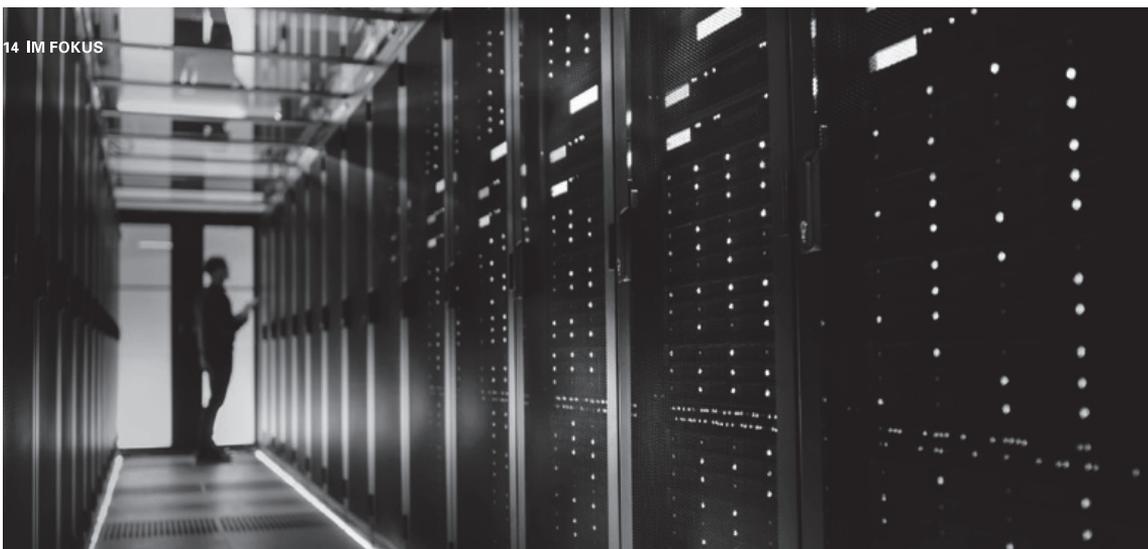
¹⁰ E-Government-Aktionsplan 2016–2020, Beschleunigung der Digitalisierung der öffentlichen Verwaltung (COM/2016/0179 final), Maßnahme 6

¹¹ Zum Beispiel: Handelsregister, Genossenschaftsregister, Partnerschaftsregister oder Unternehmensregister

Abbildung 1: Aktivitäten im Projekt „The Once-Only Principle“ (TOOP-Projekt)



Quelle: TOOP-Projekt, 2017



Bürgerkonten als Bestandteil des Once-Only-Prinzips

Für die Umsetzung des Once-Only-Prinzips können Bürgerkonten, auch E-Servicekonten genannt, als „Datensammler“ (Aggregatoren¹²) eine wichtige Komponente sein. Sie dienen dazu, in der Interaktion zwischen Bürgern und öffentlicher Verwaltung die Authentisierung zu übernehmen und zu vereinfachen. Zur Einrichtung eines Bürgerkontos ist einmalig der Personalausweis mit eID-Funktion zu erfassen, danach ist es ausreichend, wenn nur noch das Pseudonym ausgelesen wird. Somit müssen dann nur noch die eingegebenen Daten ausgelesen und nicht alle persönlichen Daten erneut eingegeben werden. Für Unternehmen funktioniert der Prozess auf dem gleichen Weg mithilfe der eID einer oder mehrerer Personen in der Unternehmensverwaltung.

In Deutschland ist der „Neue Personalausweis“ mit eID-Funktion essenziell für die Zwei-Faktor-Authentifizierung. Diese stellt sicher, dass die Person, die sich für das Bürgerkonto einloggt, auch diejenige ist, auf die das Konto ausgestellt ist. Zur Aktivierung des Bürgerkontos ist jedoch nicht zwingend ein Personalausweis erforderlich. Allerdings ist das Vertrauensniveau einer Authentifizierung ohne Personalausweis deutlich niedriger. Dies begründet, weshalb für Konten, auf die auf diese Weise zugegriffen wird, weniger Services zur Verfügung stehen. Bürger- bzw. E-Servicekonten sind Teil der eID-Strategie des IT-Planungsrats des

Bundes und der Länder, die Anleitungen zur Integration von elektronisch basierten Systemen für Behörden vorgeben¹³. Die Umsetzung der Strategie, bei der auch die Nutzung der eID-Funktion zur Einrichtung möglich ist, hat 2015 begonnen. Zwischenzeitlich bieten verschiedene öffentliche und private Dienstleister entsprechende E-Servicekonten an.¹⁴

Ein E-Mail-Konto oder ein anders gearteter Kommunikationskanal (zum Beispiel De-Mail) innerhalb der Bürgerkonten ermöglicht einen sicheren Austausch zwischen Bürgern und Verwaltung. Diese Möglichkeiten entstehen aber wie Bürgerkonten-Anwendungen in Deutschland bisher von unten nach oben. Dies bedeutet, dass es eine dezentrale Entwicklungsstrategie gibt, in der die Kommunen und Länder ihre eigenen Konzepte und Programme (zum Beispiel für die Aktualisierung von Behördendaten bei Umzug oder Sitzverlegung) einführen. Eine bundesweite Strategie wurde mit der eID-Strategie zwar entworfen, aber bisher noch nicht wirkungsvoll umgesetzt. Die Vernetzung dieser dezentral erschaffenen Konten ist aktuell noch eine größere Herausforderung, da die Systeme untereinander oft noch nicht kompatibel sind. Eine generelle Lösung zur Optimierung dieses Prozesses gibt es zurzeit noch nicht.

Sowohl auf nationaler als auch europäischer Ebene werden zurzeit die begleitenden Rechtsgrundlagen entwickelt: In

Deutschland hatte der Bund mit dem Gesetz zur Förderung der elektronischen Verwaltung im Sommer 2013 die Voraussetzungen für den weiteren Ausbau zeit- und ortsunabhängiger Verwaltungsdienste in Form von E-Government-Lösungen geschaffen.¹⁵ Diesem Gesetz folgten die jeweiligen E-Government-Gesetze der Länder zur weiteren Spezifizierung. Ein zentraler europäischer Baustein ist die sogenannte eIDAS-Verordnung¹⁶, die die bisher geltende Signaturrichtlinie aufgehoben hat. Die Verordnung schafft europaweit die rechtliche Basis für elektronische Identifizierungsmittel und Vertrauensdienste sowie für elektronische Signaturen, Siegel und Zeitstempel. Auch elektronische Dokumente, Dienste für die Zustellung elektronischer Einschreiben und Zertifizierungsdienste für die Website-Authentifizierung fallen darunter. Zusammen bilden diese Vorschriften den Rechtsrahmen für interoperable Bürger- und E-Servicekonten.

Auch außerhalb Deutschlands geht der Aufbau der entsprechenden technischen und organisatorischen Infrastruktur weiter voran. Nachfolgend finden sich einige Beispiele aus anderen EU-Mitgliedstaaten.

Österreich

Das österreichische Bürgerkonten-Modell ist die Bürgerkarte bzw. die Handy-Signatur als mobile Variante der Bürgerkarte. Beide Varianten sind an eine Form der Bürgerkarte, die e-card, also die österrei-

¹² Ein Aggregator ist eine Software oder ein Dienstleister, der (digitale) Medieninhalte sammelt, aufbereitet und gegebenenfalls abschließend kategorisiert. Quelle: Wikipedia, Duden

¹³ eID-Strategie: Gesamtstrategie für den Einsatz elektronischer Identifizierungs- und Signaturverfahren im E-Government, verfügbar unter: www.it-planungsrat.de/DE/Projekte/Steuerungsprojekte/eIDStrategie/eID_strategie_node.html

¹⁴ Beispiele auf Basis einer Umfrage zur Marktübersicht, verfügbar unter: www.oefentlichte-it.de/buergerkonto

¹⁵ E-Government-Gesetz vom 25.7.2013, (BGBl. I S. 2749)

¹⁶ Verordnung (EU) Nr. 910/2014 über elektronische Identifizierung und Vertrauensdienste für elektronische Transaktionen im Binnenmarkt

chische Sozial- und Krankenversicherungskarte, gebunden. Im Gegensatz zum deutschen Modell, bei dem es auch Karten gibt, die nicht E-Signatur-fähig sind, ist die österreichische Karte hierzu immer in der Lage, da der Chip – der normalerweise von Ärzten, Krankenhäusern und Versicherungen ausgelesen wird – dies ohnehin leisten muss. Die Freischaltung von Bürgerkonto bzw. Handy-Signatur wiederum ist freiwillig. Derzeit liegt die Zahl der aktiven Handy-Signaturen bei rund 837.000. Darüber hinaus gibt es 116.000 Karten mit Bürgerkarten-Funktion (Signaturkarten wie A-Trustkarten, Dienstkarten oder Karten von verschiedenen Berufsgruppen etc.). Pro Monat werden zwischen 15.000 und 20.000 Neuaktivierungen verzeichnet. Die Nutzung der Handy-Signatur liegt bei circa 300.000 pro Monat.¹⁷

Belgien

Belgien hat europaweit eines der am schnellsten gewachsenen E-Government-Projekte proportional zur Bevölkerung des Landes. Schon 2009 wurde eine volle Abdeckung der relevanten Bevölkerung erreicht und auch die Nutzungszahlen der Kids-ID, einem Ausweis mit elektronischen Fähigkeiten für Kinder und Jugendliche, steigen stetig. Bei der Einführung neuer E-Service-Angebote sind Markt- und Bürgerverhaltensanalysen erfolgt. Dies trug dazu bei, die E-Government-Anwendungen an den Bedürfnissen der Bürger auszurichten, steigerte somit die Akzeptanz und ermöglichte ein schnelles Wachstum. Auch in Belgien sind die Authentifizierung und die Nutzung der elektronischen Ausweise freiwillig. Diese sind an die Ausweiskarte gebunden. Die hierauf gespeicherte eID ermöglicht eine Identifikation bei verschiedenen Verwaltungseinheiten, elektronische Unterschriften und ein sicheres Einloggen zu öffentlichen Services. Darüber hinaus gibt es in Belgien die „My File“-Funktion. „My File“ ist ein System, in dem jeder Bürger überprüfen kann, welche Verwaltungsmitarbeiter die eigenen Daten im Nationalen Bevölkerungsregister aufgerufen haben. Anfragen von Sicherheitsbehörden und juristischen Stellen sind von dieser Trans-

parenz jedoch ausgenommen.¹⁸ Der „My File“-Anwendung wird großen Einfluss auf die Akzeptanz der E-ID-Karten in Belgien zugeschrieben.

Tschechien

Tschechien verfolgt einen etwas abweichenden Ansatz. Dort wurde die Entwicklung und Verwaltung der eID – MojeID genannt – an eine private Firma ausgelagert. Die Ausgabe der eID, die auch hier an die Ausweiskarte gekoppelt ist, begann im Jahr 2012. Auch hier ist das System an den Personalausweis gebunden, der zur Authentifizierung dient. Die Bürger können mit der Karte eine wachsende Zahl an Services wahrnehmen. Unter anderem können sie elektronische staatliche Aufzeichnungen einsehen, die die gleiche juristische Bedeutung haben wie eine beglaubigte Kopie. Im Gegensatz zu vielen anderen Programmen in Europa ist das tschechische Programm verpflichtend für alle Bürger über 15 Jahren.¹⁹

Estland

In Estland, das als besonders fortgeschritten im Bereich des E-Government gilt, haben 98 Prozent aller Einwohner eine eID, die Ausweiskarte und elektronische ID umfasst. Davon nutzen 88 Prozent das Internet regelmäßig und 67 Prozent in Verbindung mit der eID-Funktion; insgesamt wurden bisher von mehr als einer Million Bürgern 350 Millionen elektronische Unterschriften geleistet.²⁰

Andere Systeme wie das deutsche oder italienische stehen eher am Beginn der Entwicklung. Italien begann erst 2016 mit der Ausgabe von eID-Karten und auch dieses System kämpft mit lokalen und regionalen Unterschieden. Diese Herausforderungen beginnen bereits bei der Ausgabe, da erst 2018 alle italienischen Bürgerämter in der Lage sein sollen, die eID-Karten auszugeben.²¹ Die momentan technisch und auch in der Annahme durch die Bevölkerung führenden Sys-

teme sind das zuvor beschriebene Modell Belgiens und der estnische Ansatz.

Zusammenfassung

Das TOOP-Projekt und die Bürgerkonten bilden die Voraussetzung für den weiteren Ausbau des Digital Single Markets und den Aufbau des Single Digital Gateways. Die Bürgerkonten sind die nationalen Bausteine für eine Vernetzung auf europäischer und nationaler Ebene. Insgesamt ist festzuhalten, dass die meisten europäischen Länder inzwischen eID-Karten-Systeme mit unterschiedlichem Erfolg und Umsetzungsstärke eingeführt haben. Die genannten Beispiele zeigen die Vielschichtigkeit dieser Projekte. Gemeinsames Ziel der Initiativen ist es, dass immer mehr Behörden Bürger- bzw. E-Servicekonten nutzen, um ihre Verwaltungsdienstleistungen auf elektronischem Weg bereitzustellen.

Durch das Angebot von Bürger- und E-Servicekonten können die für den jeweiligen Einzelfall notwendigen Daten für eine rechtsverbindliche elektronische Kommunikation zwischen Bürgern, Unternehmen sowie der öffentlichen Verwaltung bereitgestellt und übermittelt werden. Das europäische Projekt TOOP wird die hierfür notwendige technische Basis zum Datenaustausch liefern und anhand der ausgewählten Pilotverfahren für Unternehmensdaten erproben. Außerdem wird die Interoperabilität zwischen den verschiedenen Systemen getestet. Zusammen werden diese Maßnahmen eine Ausdehnung auf weitere Bereiche, etwa die Nutzung in weiteren Gebieten für Unternehmen und für Privatpersonen, vorantreiben. |

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¹⁸ Entwicklung in Belgien: www.gemalto.com/brochures-site/download-site/Documents/gov_belgium_id.pdf und <https://eid.belgium.be/en/what-eid>

¹⁹ Entwicklung in Tschechien: www.gemalto.com/brochures-site/download-site/Documents/gov_cs_czech_eid_card.pdf und <https://www.mojeid.cz/>

²⁰ Entwicklung in Estland: <https://e-estonia.com/solutions/e-identity/> und <https://www.sk.ee/en>

²¹ Entwicklung in Italien: www.gemalto.com/govt/customer-cases/new-national-identity-card-for-italy und www.spid.gov.it

¹⁷ Quelle: Bundeskanzleramt Österreich, September 2017

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A Common Misunderstanding about Capitalism and Communism

Through the Eyes of Innovation

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Abstract

This paper argues that theories of communism and capitalism need not be considered as opposites or alternatives, but rather systems that satisfy different stages of humanity's technological development. The argument derives from Maslow's hierarchy of needs and a focus on the role of innovation within systems. Some argue that capitalism focuses on the lower, and communism on the higher, layers of the hierarchy, which lays the basis for their inability to compete in different periods.

Keywords: Capitalism, Innovation, Communism, Maslow, Development of Economic Thought

JEL-Codes: B14, O15

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1.0 Introduction

This paper's objective is to show that communism and capitalism should not be seen as competing systems, but rather as economic systems for potentially successive periods in human development. The analysis takes a path different than the usual argument that communism is only possible if socialism changes the human perception of selfishness. In this paper, socialism is understood as what Marx called the lower stage of communism (Marx, 2010). We argue that capitalism, as a system whose core purpose it is to provide services and material goods to satisfy material and basic Maslowian needs, is a system that fails to support the will and ability of its subjects to strive for higher Maslowian needs. The second layer, one of security, is disrupted by the continuous changes and constant generation of new needs. Such a system would be close to ideal to push humanity's technological development as a self-supporting loop of need creation and need fulfilment. So, most stakeholders in the system would promote some emerging, or uphold mature, innovations. Any capitalistic system is able to harvest the energy of individuals for labour to create innovation, but it also keeps the population focused on the lowest layer of Maslowian needs with this mechanism. In present-day capitalistic systems in the "developed" and economically strong parts of the world, scarcity of most goods is an artificial construct derived from the creation of desires and needs. The question this paper is interested in is: what happens if almost all human labour and even the innovation process is automated? Would such a society be sustainable in the long run if the largely unemployed population would require continuous innovation to preoccupy itself with trying to fulfil the needs of the physical and basic layer while being unable to work? *Capitalism with an unemployed, bored, impoverished population without perspective is not sustainable.* The hypothesis of this paper is that capitalism is a great economic system for the 'self-development phase' of humanity, while communism is more suitable for a phase in which humans are not occupied with innovation, and the first layer of needs is satisfied through other means.

The authors do not endorse any of the systems. The first objective of this paper is to show that communism and capitalism are suitable for fundamentally different phases in human technological

development, and that these systems are not able to compete in different development phases because each has an important – yet fundamentally different – role in humanity’s technological development. Second, the authors believe that complete automation of work is not necessarily a desirable objective, as work is also a way to attain self-worth. Labour can possess an intrinsic value that should not be marginalized for individual. However, the current drive towards minimizing human labour and increasing technological potential leads to the conclusion that computers will be better than humans in everything at some point in time. Work in general, for this paper, is used in a positivistic way. Labour or work is neither good nor bad.

To proceed with the paper, interpretations of two basic concepts must be clarified. First, any need is subjective; it is a product of the time, social status and culture of the particular person. This interpretation is adapted from Maslow (1943) and Doyal and Gough (1984). The same is considered for human wants that are always conditioned by the situation and condition of the particular person. Here, it is enough to understand wants as a softer and weaker form of needs that are not accounted for as actual needs.

1.0 Maslow’s Theory of Human Motivation

Maslow’s theory about human needs and motivation has echoed through the decades. It describes a hierarchical system where the lower and basic needs must be fulfilled to enable development to the higher stages, or as Maslow put it, ‘...basic human needs are organized into a hierarchy of relative prepotency’ (Maslow 1943, p.6). The basic layer of needs encompasses physiological needs that ensure our survival and physical well-being. These needs are not urges and appetites, as these are spontaneous indications of a certain lack of chemicals, or a response to addictive substances, like sugar. Basic needs are not limited to nutritional factors. They include activity, sleep, sexual desire, and parental behaviour. Maslow states that it is senseless to provide a conclusive list of basic needs, as they are numerous. Needs also evolve not only subjectively for an individual, but also for the individual’s social group, which adapts to standards, technology and social development (Doyal and Gough, 1984).

The second level of needs is the need for safety. This layer is triggered if the previous layer is mostly satisfied, which does not need to be for an extended period. It focuses on matters such as peace, order, health, predictability, organization, safe conditions, and outer influences such as extreme weather conditions or criminal activity. One outcome derived from this layer is insurance. The layer also leads to the evolutionary preference of the known above the unknown. It can trigger the search for a protector or strong leader, often the case if intangible fear is apparent in a society.

The third and middle layer consists of needs for love and belongingness and develops when safety is mostly provided. This layer triggers the need for affection and leads to the human need of making friends, sticking to your family, nurturing children, and having a partner. It is hence the level of intimacy and connection.

The fourth is the esteem layer. It consists of two components. One pertains to self-esteem and self-confidence, self-worth, strength, capability, and the perception of usefulness; the other pertains to the respect of others, reputation, prestige, and need to be unique. The fifth and last layer represents self-actualization. Its need is related to the final striving towards happiness. Maslow writes, 'A musician must make music, an artist must paint, a poet must write, if he is to be ultimately happy. What a man can be, he must be' (Maslow 1943; p.10). Every person defines each layer individually, but the top layer is particularly individual, as some aspire athletically, philosophically or artistically. Some may focus on inventions, writing, creativity, or being a brilliant parent; people choose whatever focus they deem fit. The layer is hence striving for experience, spontaneity, meaning, and inner potential.

Humans can get lost in all the layers; they can be endless and unfulfillable. The evolvement of occupying oneself with another, higher layer of the hierarchy is a highly individual process, but it can be hugely facilitated or tremendously complicated by a supportive or contradictory economic system, correspondingly, as it is only possible to focus on the satisfaction of higher needs if the lower needs are provided in that moment. To better understand the theory, one should define self-actualization in the way it is understood in psychology, and not in economic terms. Self-actualization is defined as 'being a mature, fully human person in whom the human potentialities have been realized and actualized' (Mittelman 1991,

p.116). 'This tendency might be phrased as the desire to become more and more what one idiosyncratically is, to become everything that one is capable of becoming' (Maslow 1954; p.46), or, in more general terms, 'The process of development which does not end'. The self-actualizing person has also been defined as one 'who is eager to undergo new experiences and learn new ideas and skills' (Heylighen 1992, pp. 41-43). A more precise description of self-actualization is provided by Friedman & Schustack (2004) as a congenital tendency towards spiritual growth and actualization of the individual potential.

2.0 Innovation

Generally, the major part of the conscious process of business-driven innovation is focused on the two basic layers of Maslow's concept, as most consciously driven innovation is focused on time-saving services and services that increase safety, comfort or the availability of material goods. There are other innovations, like those derived from societal security and efficiency measures, but there are also those that target the higher layers. These are social innovations that always engage a larger share of the population, and they do not necessarily occupy all of an individual's time. Today, there are mixed forms such as the approaches of sustainable or responsible innovation that try to merge pure innovation with aspects of environmental protection or health concerns.

Innovation is an essential concept for this paper. Thus, there is a need to introduce the difference between manual innovation and automated innovation. Manual innovation includes all active, human-driven innovation processes. Automated innovation includes all innovation processes that humans are no longer involved in as substantial and active actors. Manual innovation is one of the most fundamental parts of a capitalistic economic system; it is also one of the hardest parts to automate. The difference between automated and manual innovation is important, as in a society in which even innovation processes are automated, labour is almost necessarily scarce. Hence, income from work is not necessarily available to a large share of the workforce, making such a system inherently unstable. If an economy's entire production and service creation is automated, but the innovation process is still conducted by humans, labour will still

play an important role for the largest share of humanity. If the innovation process is automated to a large share, only then will labour really disappear for almost the entire population.

2.1 Innovation in Capitalism

The first economist to emphasize that innovation is an endogenous and crucial part of the capitalistic economic process was Schumpeter (1939) in the milestone work 'Business cycles'. For Schumpeter, innovation, or the term he coined, 'creative destruction', is the means for economic players to surpass competitors in costs or efficiency, and it alters the prior equilibrium forever. However, Schumpeter was not the first to emphasize the importance of innovation in capitalism. For Walras ([1874] 1954), innovation was one of the three fundamental determinants within the economic system. Schumpeter's cycle theory includes short-, medium- and long-term cyclical development (Schumpeter, 1939). The short-term cycle is of little importance for this paper as it mostly shows the psychological state of the economy and current investment behaviour (A'Hearn and Woitek, 2001). The cycle time is too short to represent larger innovation. The medium business cycle, according to Juglar ([1862] 2014), focuses on excessive speculative behaviour and the provision of credit. His theory was later reinterpreted by Schumpeter as to innovation and investment for innovation (Legrand and Hagemann, 2007).

The long-term cycle, which usually takes between 50 and 70 years, is known because of Kondratiev ([1925] 1984), who wrote that all major manual innovations develop in waves. In this case, 'waves' is another description of cycles. The idea behind long-term innovation waves is that innovation processes accumulate over time, and at a certain point a critical volume of knowledge is provided, and the technological development spikes. These spikes are the major drivers for technological and economic changes, but they are also the major source of crises, as each new wave is not yet strong enough to cope with the growth of the fully developed former wave. This basis can still be observed in Perez's structure of innovation waves or paradigms (Perez, 2002). The paradigms describe a change in industries in the way of doing business and in the mindsets of the people of the time. The emphasis here lies with the observation that these big waves of manual innovation are not bound to one industry only; they impact all industries and our social

lives. They impact our way of life and the way we think about and perceive the world. This happened not only in the current information and communication technologies (ICT) paradigm but also in the first industrial revolution, in which industrial production arose. It also happened in the paradigm of steam and railways, the paradigm of steel, electricity and engineering and the paradigm of oil, automobile and mass production. It hence happened in all five big innovation waves (Perez, 2002). The idea of fundamental social changes, and not only business changes, adds a new and important aspect to the already established concept of innovation cycles. Since 1776, five paradigms or fundamental innovation waves have changed human development tremendously (Christopher and Louca, 2001; Perez, 2002). The concept is not without criticism, but it helps form important indications on how innovation develops. Each paradigm improved living conditions in the long run. Not every paradigm led to a 'golden age', a period in which most people benefit from the economic benefits of growth produced by the paradigm. Each paradigm also provided the economic and social basis for the next paradigm to grow. Some paradigms, like the current one, benefited along the way from state-sponsored innovation, but neither the initiation nor the surge in the type of innovation would have been possible without different markets.

Innovation determines everything; it substantially alters our social lives. In a capitalistic system, systemic change through innovation is always backed by high involvement of financial markets. At first, banks generally hesitate to invest in new technologies, as risk cannot yet be calculated. Market share is covered mostly by venture capitalists. After the first phase of introducing a new wave of technologies, such as ICT, more investors see the potential. Based on life cycle, the profitability of products from the older paradigms decrease and lose attractiveness for investors compared to the concepts and products of the new paradigm (Kregel, 2007; Perez, 2009).

Crises in general can stem from the fact that development can create some divergence between ongoing innovation and supposedly robust financial structures (Papadimitriou and Wray, 2008), which means that innovations renew the composition and behavioural patterns within a market. Thus, the supervising entities and regulations remain the same while the market and technology develop around them, which leads to a

situation that cannot be sustained in the long run. Thereby, regulations need to be timely and technologically adequate (Hodgson, 2001) to stabilize innovation, development and growth. Minsky (1992, p.8) described the process of destabilization, saying, ‘prolonged prosperity transits from financial relations that make for a stable system to financial relations that make for an unstable system’. Times of ‘prolonged prosperity’ trigger a continuous process towards destabilization, as the source of instability is the use of opportunities for profit making and innovation in the markets. Alternatively, as Minsky described, ‘...innovations result from profit opportunities’ (Minsky 1986, p.359). This drive towards profit lets market players innovate, regardless of whether it is in developing new products, structures or forms of market interaction. Innovations always depend on their particular time. Today, for example, speculation in foreign exchange markets is seen as a common way of business, but in the interwar period, it was seen as a destabilizing factor (Nurkse, 1944). Companies rightly develop new ways as established products and ways of doing business lose profitability through increased competition. Accordingly, accumulation of these small developments and internal market innovations develop over time.

Capital is crucial for technological development and, consequently, economic development. This claim was supported both by Schumpeter and Keynes (Pecchi and Piga, 2008). However, the generation of economists that included Keynes and Schumpeter was not the first to talk about technical development and economic growth. They were the first to emphasize the importance of innovation in capitalistic economies, but the implicit importance was already present in classics like *The Wealth of Nations* (Smith, 1776). Smith starts the chapter ‘Of the Division of Labour’ early in the book with the famous example of efficiency gained in the pin-making business through the division of labour. The introduction to this chapter is hence a testimonial to process innovation. It emphasizes the role of different forms of innovation for the capitalistic system. A more Darwinist approach to innovation was proclaimed by Hayek (1960), who proposed the theory of cultural evolution. It states that our habits and problem-solving methods are a product of evolutionary processes developed by humans experimenting. This focus on innovation, however, makes capitalism unstable, as shown by various researchers, some of whom are mentioned above. There is no such

thing as continuous, stable innovation or growth in the long run. System-changing innovation leaps forward and slows down again, as humans must get used to the innovation paradigm before the next wave can even begin to develop. Such development can only be changed by a fully automated innovation process; this is the exact condition that sets the current innovation paradigm apart from the paradigms of the past. An automated and increasingly self-automating system only requires always-decreasing external and manual input from humans, so fewer will be done by humans. Therefore, labour will be scarce at some point and with that, income distribution and the ability to influence future innovations will be increasingly difficult for a growing share of the population.

Almost all major schools of thought in economics have their approach and grasp of innovation. The importance of innovation within capitalistic theory and capitalist society cannot be denied. However, one question that derives from the ICT-based innovations of the last years is whether ‘Baumol’s cost effect’ is still accurate. Under this premise, a rise in manufacturing productivity generates a rise in income and a heightened demand for labour-intensive services. The claim is that automation is uneven, and complete automation will never occur. While the Baumol effect accounts for innovations of mechanical background, it does not always account for ICT-based innovation (Triplett and Bosworth, 2006) and will not account for the growing influence of Artificial Intelligence (AI) based innovations (Barrat, 2013; Scherer, 2016). Over time, self-learning systems will diminish the number of jobs available to humans. This does not mean that the ability to work or voluntary work will evaporate. However, computers, as they do not have desire and do not need to rest, can work more effectively and, from a certain point, even more emphatically than humans. Computers can see what a human requires in a situation from the data creation of the last and current generations. AI changes all, which means that such an algorithm with access to big data-based information should be able to predict future social innovations as well.

In summary, we can say that the capitalistic system is dependent on innovation, which is why society today can sustain many inhabitants of the planet with living conditions they enjoy. The history of capitalism, on

the other hand, emphasizes the unrest and instability derived from the continuous innovation process, though the continuous innovation process keeps the capitalistic system alive.

2.2 Innovation in Communism

Karl Marx stated that communism would be a positive resolution of private ownership as a form of human self-estrangement and therefore become a real human through and for humans. This process would, therefore, be a conscious and complete return of humans to a society and hence “humane humans”, based on the already-created wealth from earlier human developments (Marx 1844). This implies that Marx saw, at least in that moment, that communism would not be the catalyst for fast technological development and further focus on innovation. The transition to communism would imply that another set of factors would shift into the focus of society; innovation is not at the core of communist theory. ‘The only force that brings them together and puts them in relation with each other, is the selfishness, the gain and the private interests of each’ (Marx, 1887, p.110). Later, the adaptation of communism was advanced by other scholars. ‘Communism is utopian as long as man is what capitalism has made him: we need socialism to reshape man, to get rid of his selfishness, or as he said: ‘Selbstsucht’, and to turn him into the altruistic person communism requires’, and ‘Communism is bound to fail under conditions of scarcity: we need socialism to develop the productive powers of humankind and thus create the state of abundance in which alone communism can flourish’ (van der Veen & Van Parijs 1986; p.653). The two statements show ideological concerns between capitalism and communism, which implies that they are two approaches to the same issue, and that communism could only work if humans focused on a more socialistic perception of the world. This might be true if there was no capitalistic competition.

This paper argues that communism cannot work solely with a shift in ideology; it can only theoretically function at a state of almost full economic automation, so production, services and innovation must be automated to a large extent. For the population, such a society would, of course, be one of post-scarcity. This is an argument which can also be observed as implied in the *Critique of the Gotha Programme* (Marx and Engels, 1875) In a future where citizens can work or innovate if they choose, but they do not have to

do so, as an individual's basic necessities are already provided. In such a system, a human workforce is not necessary on a mass scale anymore; full employment is a utopia. It is in opposition to a system that needs people to focus on consumption and the lower layers of Maslow's pyramid, which would then require a massive creation of jobs completely without purpose. Disturbing is that our system is drifting more and more towards such a systemic constellation (Bregman, 2017). In theory, a communistic system could only work in such a situation if everybody could work on whatever they felt like doing on a particular day, or not work if they chose not to, which is also close to original Marxian thought (Marx, 1844). Schumpeter and Hilferding came close to similar arguments (Hilferding, 1910; Schumpeter, 1942). This argument is supported by the concept of a so-called '1848 Moment', which refers to a change in the perception of the markets and the economy. The hypothesis of this concept is that prosperous times trigger a notion of ideological praise of the markets as an objective themselves, which changes to the perception of the markets as a tool for wealth creation in economically unstable or unsatisfying times (Reinert, 2009). This moment is not a complete change, but a reallocation of the form of capitalism in use.

The high Maslowian level-oriented system of communism is not indirectly linked with innovation, as the act of innovating itself is not necessarily an activity that can be accounted for at the higher levels. Innovating can have many motivations, and only a few of them are linked to higher motivational levels. Therefore, voluntary innovation will always occur, but it is not the essence that is needed for system survival. We argue that a Marxian communist system is incapable of generating high levels of manual innovation, as the workforce is occupied providing the first layer of needs. The system, in opposition to its subjects, focuses on higher layers of needs, personal development and self-worth. This gap cannot be bridged and leads to the inevitable collapse of a not-significantly-automated communist system. First, the gap damages the relationship between the population and the leadership because it always moves further apart, while the economic situation does not necessarily improve, as not every year is equally fertile or free of crises. Second, planning errors are, in the long run, only human. Third, surrounding capitalist systems progress

economically and technologically faster, which can affect people's satisfaction with their own system. The lack in innovation impacts the system from multiple sides and makes it unsustainable in the long run.

In conclusion, communism can innovate, but innovation is not in the essence of a communistic system.

3.0 The Conflict between the Two Systems

The analysis above shows that the two systems are not focused on the same objectives. They are fundamentally different; hence, their ability to further societal development is also fundamentally different. Capitalism is mainly focused on manual innovation and the satisfaction – and creation – of basic needs of Maslow's concept. Manual innovation is not a continuous, proportionally growing process, but rather an eruptive one (Perez, 2002). These continuous but spontaneous changes are more fitting to a capitalistic system. The system occupies not only the creators but also the consumers, with constant innovations in almost all fields. The system's stability has its origins in the pure number of innovations that occupy people and create new desires and needs within the material levels. The majority of our world today is still occupied most of the day with acquiring what is needed for the two basic layers. In a society in which these layers are provided, if the individual is satisfied with affordable goods, less labour needs to be invested. Hence, a voluntary decrease in labour hours and an increase in focus on the higher layers could be observed (Kallis *et al.*, 2013). Of course, in today's societies, these developments are still marginal but quickly growing (Evans, Lippoldt and Pascal, 2001; Hamermesh and Stancanelli, 2015). The full automation of labour is very much at its beginning. Hence, possible counter activities cannot be expected to be fully grown yet.

A communist society, on the other hand, cannot develop as fast as a capitalist one, since the vast majority of all manual attention within the system is not focused on innovation. Communist theory focuses more on the higher layers of needs and built for stability, harmony and internal development if the basic layers are provided. The system cannot compete with the fast materialistic development of a capitalistic system, as the innovation of new goods and services leads to growth of new needs and desires. Capitalism thrives on this mechanism of creating desires; keeping its subjects in a cycle of gaining and desiring new goods is

essential for the survival of each company and capitalism itself. The various forms of capitalism, like statist, corporatist or neoliberal capitalism, have different abilities to fulfil and create desires, but for most of the population, their ability is limited to the first Maslowian layer (Gough, 1994). If these created desires are not fulfilled, individuals are only partially able to develop and fulfil their higher needs. Therefore, if the systems compete, the communistic system would not be able to develop its strengths, as it would have to endeavour to keep up with the needs developed and supplied in the neighbouring capitalistic system. In a capitalistic society, people find time to focus on the higher levels in short periods, in which most desires are fulfilled, but at least this would be possible. Competition at the lower layers would make it impossible for subjects of a communist society to focus on the higher layers, as the efficiency of the capitalistic neighbours could not be matched.

Additionally, occasional mis-planning could lead to economic issues and keep the population from focusing on higher layers. The communistic society would suffer in the long run, as no layer could develop ideally, which will result in an unsatisfactory system. There is not enough development and innovation to keep people occupied, and the lower needs are not sufficiently provided to allow a focus on the higher layers. Thus, communism cannot succeed in the long run in a stage of technological development in which society is still actively occupied with development of living conditions. This theory does not mean to state that communistic systems only occur after a period in which basic needs have been fulfilled, but that a communistic system can only excel if basic needs are provided externally or at least do not require most of people's time. In history, this never has been the case.

Maslow's hierarchy of needs emphasizes the impossibility of communism being successful in the current or any former development stage, as the basic layers are not provided. Humans must actively provide these layers. Communism, with its focus on the higher layers, gives no incentive to the population to enjoy the lower layers; this leads to slower material innovations. Hence, a communistic system cannot compete with a capitalistic one in a not-highly-automated developmental situation. The basic layers will always trump the higher levels. A system focused on emotional and immaterial development cannot function if the people

cannot eat or to fulfil a sufficient percentage of their other basic needs. Such a system can never play out its strengths in this type of environment. A system with a lower-layer focus, on the other hand, can develop its strengths perfectly in such an environment.

The environment changes fundamentally if the production and innovation processes are automated. In a society where automated machines provide the physiological needs of society, individuals have ample leisure time. The automation of supplementary labour is simpler than that of labour directly focused on innovation. However, by the end of the automation process, all necessary human labour can be automated, so voluntary labour might still be helpful, while the core and necessary parts are automated (Hemous and Olsen, 2013; Frey and Osborne, 2015). Thus, if the lowest layer of the hierarchy is satisfied automatically, and humans are not continuously forced to think about providing the lower two or more material layers for themselves and their families, they have the freedom to strive for higher layers. However, if there is an increasing limitation for the distribution of income because most people do not have work, individuals would start to go against the system as the use of the almost unlimited possibilities provided by automated processes would be perceived as unjust. It would create a situation like the one described by Akerlof and Shiller:

Consider fairness. As in the 1890s, the Depression of the 1930s led to an intense feeling of unfairness in employment relations and a surge of labour disputes worldwide. Communism emerged into its heyday, as intellectuals around the world began to see it as the solution to the exploitation of working people and the failures of the macro economy. A sense of instability in business institutions developed, with fears that the social contrast would be changed unpredictably (Akerlof & Shiller 2009; p.68).

In this case, Maslow's hierarchy of needs explains that a capitalistic system could not succeed, as the capitalistic incentive for people to function is gone. Unwanted interest in higher needs will be triggered if the population is provided with sufficient food and other basic needs without the constant creation of new desires. This does not mean that societies that fulfil basic needs to a sufficient level do not innovate.

However, if the focus on higher needs cannot proceed, or if, because of automation, there is no chance of new income, social unrest would certainly be triggered, as unsatisfied citizens with lots of time on their hands and little perspective are not a sustainable basis for any system. Hence, capitalism, in its purest forms, could not be sustained in such a situation. A communistically influenced system, with a focus on developing the higher layers of its subjects, on the other hand, would thrive under such conditions, as the basic layers are provided and no longer a concern for society and its subjects. Individuals would be free to focus on the higher layers of Maslow's needs, and a sustainable system would support them. Schumpeter arrived at a similar conclusion. 'As a matter of fact, capitalist economy is not and cannot be stationary. Nor is it merely expanding in a steady manner. It is incessantly being revolutionized from within by new enterprise...'

(Schumpeter 1942, p. 31).

Schumpeter's long-term perspective for a capitalistic system can be summarized by the second part of his book, *Capitalism, Socialism and Democracy*, 'Can capitalism survive?' He begins, 'No I do not think it can' (Schumpeter 1942, pp.59, 61). His perception of a socialist system can be seen in part three, 'Can Socialism survive?' to which he replies, 'Of course it can' (Schumpeter 1942, p.167). His main argument for why socialism may work is that it inspires people to strive for higher things and nobler means than within a capitalistic society. The intrinsic and long-term motivation is higher if the means defined by Maslow are continuously fulfilled.

Labour in capitalistic systems is directly or indirectly connected to innovation, supporting those who innovate or promote innovation. The pursuit of fulfilling material needs is often projected in the pursuit of money, but it has also repeatedly been shown that money does not enhance the individuals' happiness in general. It enhances individuals' ability to provide for their basic needs, but if that level is reached, money does not impact happiness anymore. Interestingly, the relationship seems to be the other way around, meaning that happiness makes it more likely for a person to achieve an increase in income. Individuals with material objectives in life tend to be unhappy if they are not wealthy. Therefore, money can be a means for happiness, but the systemic economic growth of the last decades in developed economies does not coincide

with a similar increase in systemic happiness (Diener and Biswas-Diener, 2002). This supports the claims of the last paragraph, as it emphasizes that a non-consciously or not actively innovating capitalistic system would not be sustainable (Appleby, 2010). The interpretation that communism and capitalism discuss the same issues and same development stage in human history because they are both economic systems is not suitable.

Schumpeter (1934) claimed that the end of capitalism is the result of innovation being captured within a corporate structure. The rise of such a corporate system could empower leaders to stunt and control innovation if needed to advance profits. Schumpeter stated that such a system would survive for a long time, which fits the argument of this paper. While corporate leadership would be empowered to stunt innovation, they would not necessarily do so if the markets develop into an oligopolistic or even monopolistic structure. However, if innovation is controlled by a few, then capitalism has surpassed its purpose for the technological development of humanity, which is to innovate as much and as fast as possible. It focuses only on its inherent self-interest, which is profit. Schumpeter describes the line in the sand that represents the latest stage of a system that has surpassed its purpose. Another purpose is needed at that stage.

A transition to a more social and equally distributed economy is needed in such an economy to enable a peaceful co-existence, as people would be provided with all necessary goods and would have time to develop their own interests, which is one core point of argumentation in discussion about a potential right to work or a universal income. It could be argued that a basic universal income contradicts the individual's higher development. It is also important to consider the potential of a right to labour. This merged form of capitalism and socialism would be one possible path to follow. However, regardless of the exact design of a future system, it is crucial to mention that such a system would be economically stable in the long run, as humans are occupied with whatever they like, and most of the system runs on autopilot. A capitalistic system on a similar basis would, in the end, run into a monopolistic, or at least oligopolistic, structure, as companies, or the algorithms directing them, would compete while one after another would be eliminated

or bought by bigger, pre-existing players, as the markets did not begin at same starting positions. The system would lead to extreme inequality in income and wealth, which is not sustainable over an extended period.

To keep the paper focused, we do not proceed in establishing the nuanced differences of mixed systems between socialism and communism. Also, we do not want to make any claims about the rise or transition to communism. We just endeavour to show the different applications and abilities. A societal transition underlies many influential factors we cannot get into in this paper.

An important factor is that this paper focuses on the theories in their pure theoretical forms. Real-world applications have never been, and most probably never will be, the pure form of either system. Still, these purely theoretical utopias have their purpose in motivating humankind (Hodgson, 1995a). The perception that innovation is only driven by private entities in a capitalistic system, for example, is incorrect. Initially, fundamental innovations and those that require a long time to achieve profitability are often not driven by private companies' profit motives. Many of these innovations are the product of long-lasting investment programmes that the private sector is often not willing to support. In various cases, public investment enables the first stage of developing such fundamental innovations until the markets can take over, as the risk is more predictable. This is the development phase Perez (2002) calls the surge. Fundamental technological innovations leading to the rise of a new technological age are often laid by public entities and public funding. One famous example of that from the recent paradigm is public funding for innovations leading to the iPhone, for which the internet, basic touchscreen technology, GPS and 13 fundamental components in total were publicly funded (Mazzucato, 2013). These public innovations were then provided to the private sector, enabling the rise of the most valuable company in the world. Hence, a purely private sector innovation is not the case even in the most developed countries of the world.

These tendencies show that real-world applications of capitalistic systems shift between more or less influenced adaptations of communistic and other theoretical forms of systems (Hodgson, 1995b). One rather socialistically influenced form of economic design is the classical German approach of the Social Market Economy (Drechsler, 1997). Modern tendencies, like shared usage models, social entrepreneurship and

green economics, are newer additions to the broader field of adaptations. A mixture of systems was always in place, and our economy is in a constant process of transition between the systems' nuances. The same explains real-world applications of Marxist thought in human history, regardless if one is speaking of Leninism, Stalinism, Titoism, Hoxhaism, Maoism, or any other form of implementation. None of the systems trying to make theoretical communism work in practice and competition with capitalism were able to survive in the long-term. All systems suffered after some time under scarcity and too little innovation. Fitting with our argument, one could say that scarcity kept the population providing basic goods, while the systems lacked in providing incentives to individuals to innovate. The systems were eliminated or had adapt substantially to survive. It needs to be mentioned that purely theoretical communism and practical communistic systems are not the same at all. These cases are also a partial confirmation of our theory that communism and capitalism should have never competed in the first place.

At this point, is it also worth mentioning that the same logic applies in the competition with other political and economic systems. The feudal system was held by power and brute force, but it had to give in to reform, as individuals on the lower levels of the power hierarchy pushed for a system that would ensure satisfaction of the lowest needs at any point in time. Capitalism took over, as it was a system that could provide that, regardless of all distributional, greedy and even terrifying aspects that young capitalism created.

4.0 Conclusion

There should have never been a conflict between the two systems, as they simply cannot compete at any point in time in human development. The mixed forms, however, are very much able to compete, and their use shows the perceived developmental stage of society that employs the particular form. Pure and theoretical systems have different objectives and different appropriate times of usage. All economic systems exist to satisfy human needs. Human needs can be differentiated into layers, and different economic systems focus on different hierarchical layers. Capitalism focuses on innovating material goods and services through continuous innovation and competition. The system persists through constant change and occupation for the population. Occupation in this instance refers to both working and having the mind filled up with other

things. The system also engages the population by the creation of needs through the constant creation of new products and services. Communism, on the other hand, focuses on higher-layer development of its citizens. Communism mostly ignores the lower layers. It does not focus as much attention on innovation and is a system focused on post-scarcity periods. The innovation rate is not as high as in an innovation-focused capitalistic system.

The paradigms that systemically push important innovations have changed over the years. The current ICT-focused paradigm differs from the last innovation waves. It automates an always-increasing share of jobs in society, and it has the potential to create a state of Artificial General Intelligence, in which machines will be able to perform any intellectual task more efficiently than humans. Such a state is not around the corner, but it is also no longer illusive. It is a fact that society is moving profoundly towards that status. In a society where the need for human labour is scarce, capitalism is not at its strongest as income is required to fulfil needs. If needs are no longer fulfilled, then the system becomes unstable. Communism, in its classical theoretical form, on the other hand, cannot compete if the lower layers are not provided automatically, or externally. However, if those layers are provided automatically, then it can show its strengths and enable individuals to focus on higher layers of needs.

The authors do not wish to speak for or against either system. The argument is only that communism and capitalism should not be seen as competing, and it was an error to do so. Each system has its own purpose and applications. Capitalism builds implicitly on the basic desires of humans, while communism focuses implicitly on higher layers of human desire. The paper also discusses that mixed forms and tendencies to move between aspects of both systems are crucial for practical adaptation of either system to a particular development stage. Tendencies such as shared, green, social, sustainable, and post-growth economies are such partially mixed forms in our current time, which can be seen as adaptations to a slowly growing automation of labour.

Whether any system will become a post-scarcity society depends largely on the design of the system. It is possible that technologically driven development keeps back systemic change, while a potentially

increasing inequality could benefit a systemic transition. Both are equally possible and will most probably lead to mixed forms in the practical adaptation of the two most famous economic systems, but to discuss these developments requires another paper.

The consequence of this paper is that capitalism and communism are not and never should have been treated as competitors, as they are not focused on the same issues and not even on the same period in humanity's development.

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5.0 Bibliography

A'Hearn, B. and Woitek, U. (2001) 'More international evidence on the historical properties of business cycles', *Journal of Monetary Economics*, 47(2), pp. 321–346. doi: 10.1016/S0304-3932(01)00045-9.

Akerlof, G. A. and Shiller, R. J. (2009) *Animal Spirits*. Princeton University Press.

Appleby, J. (2010) *The Relentless Revolution - A History of Capitalism*. 1st edn. New York: W.W. Norton & Company.

Barrat, J. (2013) *Our final invention : artificial intelligence and the end of the human era*. Available at: https://books.google.at/books?hl=en&lr=&id=KQ8zsFhlmg0C&oi=fnd&pg=PP3&dq=AI+experts+assume+that+computers+will+be+better+than+humans+in+everything+by&ots=g_B24KR0Kb&sig=yxhbWdLEgQokhUThgZFaInss1qQ&redir_esc=y#v=onepage&q&f=false (Accessed: 19 July 2017).

Bregman, R. (2017) *A growing number of people think their job is useless. Time to rethink the meaning of*

work, *World Economic Forum*. Available at: <https://www.weforum.org/agenda/2017/04/why-its-time-to-rethink-the-meaning-of-work/> (Accessed: 15 January 2018).

Christopher, F. and Louca, F. (2001) *As time goes by. From the industrial revolution to the information revolution*. Oxford University Press.

Diener, E. and Biswas-Diener, R. (2002) 'Will Money Increase Subjective Well-Being?', *Social Indicators Research*, 57(2), pp. 119–169.

Doyal, L. and Gough, I. (1984) 'A theory of human needs', in Axford, N. (ed.) *Defining and Classifying Children in Need*. Routledge, pp. 6–38.

Drechsler, W. (1997) 'State Socialism and Political Philosophy', in Backhaus, J. G. (ed.) *Essays on Social Security and Taxation: Gustav von Schmoller and Adolph Wagner Reconsidered*. Marburg: Metropolis Verlag.

Evans, J. M., Lippoldt, D. C. and Pascal, M. (2001) *Trends in Working Hours in OECS Countries*. 45. Paris.

Frey, C. B. and Osborne, M. (2015) *Technology at work: the future of innovation and employment, VOCED plus - NCVER's international tertiary education research database*. Oxford Martin School and Citi GPS.

Friedman, H. S. and Schustack, M. W. (2004) *Personality: Pearsons New International Edition: Classic Theories and Modern Research (Persönlichkeitspsychologie und Differentielle Psychologie)*. 2nd edn. Pearson Studium.

Gough, I. (1994) 'Economic Institutions and the Satisfaction of Human Needs', *Journal of Economic Issues*, 28(1), pp. 25–66.

Hamermesh, D. S. and Stancanelli, E. (2015) 'Long Workweeks and Strange Hours', *ILR Review*, 68(5).

- Hayek, F. A. (1960) *The Constitution of Liberty*. Chicago: University of Chicago Press.
- Hemous, D. and Olsen, M. (2013) 'The Rise of the Machines: Automation, Horizontal Innovation and Income Inequality', *SSRN Electronic Journal*. doi: 10.2139/ssrn.2328774.
- Heylighen, F. (1992) 'A Cognitive Systematic Reconstruction of Maslow's Theory of Self-Actualization', *Behavioral Science*, 37.
- Hilferding, R. (1910) *Das Finanzkapital: Eine Studie über die jüngste Entwicklung des Kapitalismus (Finance capital: a study of the latest phase of capitalist development)*. Ignaz Brand Verlag.
- Hodgson, G. M. (1995a) 'The Political Economy of Utopia', *Review of Social Economy*. The Association for Social Economics, 53(2), pp. 195–214. doi: 10.1080/00346769500000022.
- Hodgson, G. M. (1995b) 'Varieties of Capitalism from the Perspectives of Veblen and Marx', *Journal of Economic Issues*. Routledge, 29(2), pp. 575–584. doi: 10.1080/00213624.1995.11505694.
- Hodgson, G. M. (2001) *How economics forgot history*. 1st edn, *The problem of historical specificity in social science*. 1st edn. New York: Routledge.
- Juglar, C. (2014) 'Des crises commerciales et de leur retour périodique (Economic crises and their periodical return)', *ENS Éditions*.
- Kallis, G. *et al.* (2013) "'Friday off": Reducing Working Hours in Europe', *Sustainability*, 5(4), pp. 1545–1567.
- Kregel, J. (2007) 'The natural instability of financial markets', *The Levy Economics Institute Working Paper*, (523).
- Legrand, M. D. P. and Hagemann, H. (2007) 'Business cycles in Juglar and Schumpeter', *History of Economic Thought*, 49, pp. 1–18.
- Marx, K. (1844) *Ökonomisch-philosophische Manuskripte aus dem Jahre 1844 (Economic and*

philosophical manuscripts of 1844), Werke.

Marx, K. (1887) *Capital - The Process of Production of Capital*. Moscow: Progress Publishers.

Marx, K. (2010) *A Contribution to the Critique of Political Economy*, Springer Link. Palgrave.

Marx, K. and Engels, F. (1875) *Kritik des Gothaer Programms (Critique of the Gotha Programme)*.

Available at: <https://marxwirklichstudieren.files.wordpress.com/2012/11/kritik-gothaer-programm.pdf>.

Maslow, A. H. (1943) 'A Theory of Human Motivation', *Psychological Review*, 50(4), pp. 370–396. doi: 10.1037/h0054346.

Maslow, A. H. (1954) *Motivation and Personality*. Harper & Row.

Mazzucato, M. (2013) *The Entrepreneurial State: Debunking Public vs. Private Myths in Risk and Innovation*. Anthem Press.

Minsky, H. P. (1986) *Stabilizing an Unstable Economy*. Yale University Press.

Minsky, H. P. (1992) 'The Financial Instability Hypothesis', in *Handbook of Radical Political Economy*. (Prepared for Handbook of Radical Political Economy, edited by Philip Arestis and Malcolm Sawyer, Edward Elgar: Aldershot, 1993).

Mittelman, W. (1991) 'Maslow's Study of Self-Actualization: A Reinterpretation', *Journal of Humanistic Psychology*, 31(1), pp. 114–135.

Nurkse, R. (1944) 'International currency experience: lessons of the interwar period', *League of Nations*, 4.

Papadimitriou, D. B. and Wray, L. R. (2008) 'Minsky's Stabilizing an Unstable Economy: Two Decades Later', in *Stabilizing an Unstable Economy*, pp. xi–xxxv.

Pecchi, L. and Piga, G. (2008) *Revisiting Keynes: economic possibilities for our grandchildren*. MIT Press.

- Perez, C. (2002) *Technological Revolutions and Financial Capital - The Dynamics of Bubbles and Golden Ages*. Cheltenham, UK: Edward Elgar Publishing Limited.
- Perez, C. (2009) 'The double bubble at the turn of the century: Technological roots and structural implications', *Cambridge Journal of Economics*, 33(4 SPEC. ISS.), pp. 779–805. doi: 10.1093/cje/bep028.
- Reinert, E. S. (2009) *Financial Crises, Persistent Poverty, and the Terrible Simplifiers in Economics: A Turning Point Towards a New '1848 Moment', Technology Governance*. Tallinn.
- Scherer, M. U. (2016) 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies', *Harvard Journal of Law & Technology*, 29(2).
- Schumpeter, J. A. (1934) *The Theory of Economic Development*. Tenth prin. Cambridge, MA: Transaction Publisher.
- Schumpeter, J. A. (1939) *Business cycles*. 1st edn. New York: McGraw-Hill Companies.
- Schumpeter, J. A. (1942) *Capitalism, Socialism & Democracy*. London, New York: Routledge.
- Smith, A. (1776) *The Wealth of Nations - A Landmark Classic*.
- Triplett, J. E. and Bosworth, B. P. (2006) '‘Baumol’s disease’ has been cured: IT and multifactor productivity in US services industries', in Dennis W. Jansen (ed.) *The New Economy and Beyond: Past, Present and Future - Google Books*. 1st edn. Northhampton: Edward Elgar, pp. 34–71.
- Veen, R. van der and Parijs, P. van (1986) 'A Capitalist Road to Communism', *Theory and Society*, 15(5), pp. 635–655.
- Walras, L. (1954) *Elements of pure economics*. Routledge Library Edition.

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- III **Fischer, Dirk-Hinnerk,** and Krimmer, Robert. 2018. "Towards a Networked Modern Democracy – Thoughts on How ICT Could Enable New Forms for the Relationship Between Citizens and their Representatives." *dg.o 2018: Proceedings of the 19th Annual International Conference on Digital Government Research* (3.1)
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- V Krimmer, Robert, and **Fischer, Dirk-Hinnerk.** 2016. "Gedanken zu einem negativen Wahlsystem und der mögliche positive Einfluss." *Jusletter IT* 25 May (1.2)
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- VII Krimmer, Robert, and **Fischer, Dirk-Hinnerk.** 2017. "Evaluation zur elektronischen Auszählung von Stimmen (E-Counting): Technisches Expertenmandat." Report for the Swiss parliamentary administration control (2.5)
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- II **Fischer, Dirk-Hinnerk.** 2017. "How Tracking of Electronic Money might Improve Financial Market Crisis Intervention." *Management* 12 (4): 299–314 (1.2)
- III **Fischer, Dirk-Hinnerk,** and Krimmer, Robert. 2018. "Towards a Networked Modern Democracy – Thoughts on How ICT Could Enable New Forms for the Relationship Between Citizens and their Representatives." *dg.o 2018: Proceedings of the 19th Annual International Conference on Digital Government Research* (3.1)
- IV **Fischer, Dirk-Hinnerk.** 2015. "A Comparison of the Economic Situation of Tyrol, Austria in Three Key Periods." *Baltic Journal of European Studies* 5 (1) (18) (1.2)
- V Krimmer, Robert, and **Fischer, Dirk-Hinnerk.** 2016. "Gedanken zu einem negativen Wahlsystem und der mögliche positive Einfluss." *Jusletter IT* 25 May (1.2)
- VI **Fischer, Dirk-Hinnerk.** 2016. "Making a mark – Time Changing Politics from Estonia." *Baltic Journal of European Studies* 6 (1) (20) (1.1)
- VII Krimmer, Robert, and **Fischer, Dirk-Hinnerk.** 2017. "Evaluation zur elektronischen Auszählung von Stimmen (E-Counting): Technisches Expertenmandat." Report for the Swiss parliamentary administration control (2.5)
- VIII Krimmer, Robert, **Fischer, Dirk-Hinnerk,** and Schmidt, Carsten. 2017. "Bürgerkonten und das Projekt 'Once-Only Principle'." *Public Governance* 4 (1.2)
- IX Krimmer, Robert, and **Fischer, Dirk-Hinnerk.** 2017. "The E-Voting Mirabilis: A Conceptual Framework for the Analysis of ICT in Elections." *Revista Expert Electoral* 3 (16) (1.2)
- X Krimmer, R., **Fischer, Dirk-Hinnerk,** and Schmidt, C. 2018. "Digitalisierung und E-Health in Europa." *Ersatzkasse Magazin* 5/6: 36–37 (6.3)
- XI Schmidt, C., Krimmer, R., and **Fischer, D.-H.** 2018. "Ein dynamisches Umfeld – Aktuelle Entwicklungen in E-Justice in Deutschland und Europa." *e-Justice* (6.3)
- XII **Fischer, D.-H.,** and Yeritsyan, H. 2018. "A Common Misunderstanding about Capitalism and Communism Through the Eyes of Innovation." *Economic Thought* 7 (2) (1.1)

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