

Short CV Mathias Beck, ETH Zurich

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Google Scholar: <https://scholar.google.com/citations?user=9vW08csAAAAJ&hl=de>

Research interests: Strategic Management, Innovation, Digital Transformation, Strategic Alliances, Open Innovation, Technology Management, Policy Analysis, Circular Economy, Innovation Policy, Industry-Science links, Applied Econometrics.

Professional appointments: Senior Scientist and Lecturer at the Department of Management, Technology and Economics, KOF Swiss Economic Institute, ETH Zurich, Switzerland. Since 9/2023.

Lecturer at the Swiss Distance University of Applied Sciences (FFHS), Member of SUPSI, Switzerland. Since 8/2016.

Previous: Post-Doc and Lecturer at the Department of Management, Technology and Economics, KOF Swiss Economic Institute, ETH Zurich, Switzerland. 9/2017-8/2023.

Post-doctoral researcher and Lecturer at the Department of Business Administration, Chair for Entrepreneurship, Prof. Dr. Ulrich Kaiser, and Chair of Technology, and Innovation Management, Prof. Dr. Anja Schulze, University of Zurich. 2/2016-8/2017.

Research Associate at IPG – innovate Performance Grow. SWISS IPG PARTNERS GROUP. Innovation Think Tank. Zurich, Switzerland. 8/2016-12/2018.

Research and Teaching Assistant at the Chair for Performance Management (Prof. Dr. Dr. h.c. Andrea Schenker-Wicki), Director Executive MBA, Department of Business Administration, University of Zurich, Switzerland. 2/2010–1/2016.

Intern at Porsche Consulting GmbH, target engineering division. Bietigheim-Bissingen, Germany. 10/2006–1/2007.

Intern at gambro dialysatoren GmbH, Hechingen, Germany. 8/1999–8/2004.

Education: Habilitation at the Department of Management, Technology, and Economics at ETH Zurich (2018-date), PhD in Management & Economics, at the Faculty of Business, Economics and Informatics of the University of Zurich. 2/2016. Thesis: Public Innovation Policies: An Empirical Analysis of Subsidies and Collaboration (*summa cum laude*). Supervisor: Prof. Dr. Dr. h.c. Andrea Schenker-Wicki, Chair for Performance Management and President University of Basel; co-supervisor: Prof. Dr. Ulrich Kaiser, Chair of Entrepreneurship, University of Zurich.

Teaching Skills Certificate Program UZH, University of Zurich. 10/2015.

M.Sc. in Industrial Engineering and Management (Diplom Wirtschaftsingenieur) at the Karlsruhe Institute of Technology, Germany. Supervisor of thesis: Prof. Dr. Hariolf Grupp, Chair of System dynamics and Innovation, Institute of Economic Policy and Economic Research, Karlsruhe Institute of Technology.

Fellow at Luiss Guido Carli in Rome, Italy, Department of Economics and Business. 9/2004-7/2005.

Studies in Medicine, University of Tübingen, Germany. 10/1999–8/2000.

Abitur at Staatliches Gymnasium Hechingen, Germany. 6/1999.

Selected funded projects (Principal Investigator, Co-Project Leader, Project Contributor):

Digital Transformation: how it changes Organizations, Performance, and Markets, funded by the Swiss National Research Programme (NRP77). 2020-2026. (Grant 435'837 CHF). Role: PI

Innosuisse Pilot Monitoring and Evaluation 2019-20, funded by Innosuisse. 2019-ongoing. (Grant 67'000 CHF). Role: Co-PI

Danish-Swiss Impact Study of R&D performing SME's participating in the Eurostars innovation programme, funded by SERI (State Secretary for Education, Research, and Innovation) and Innovation Fund, Denmark. 2018-2020. (Grant 150'000 CHF). Role: PI

Knowledge and Technology Transfer in Switzerland, funded by SERI (State Secretary for Education, Research, and Innovation). 2018-2020. (Grant 200'000 CHF). Role: Co-PI

Analysis of the digitization of the Swiss economy and the identification of possible implications for quality management, funded by SFAQ (Schweizerische Stiftung für Forschung und Ausbildung “Qualität”), 2017-2020. (Grant 90'000 CHF). Role: PI

On the effects of research and development, funded by: DASTI Danish Agency for Science Technology & Innovation, Ministry of Higher Education & Science, Denmark. 2016-2017. (Grant 50'000 CHF). Role: Co-PI

Teaching: Introduction into Microeconomics (Bachelor) at ETH Zurich (since 2017).

Economics and Management of Innovation (M.Sc.) (lecture) at FFHS (since 2015).

Innovation Research Projects (M.Sc.) (Seminar); Strategic Planning (M.Sc.) (Seminar).

System analysis; Performance Management (Executive MBA, Master, and Bachelor) Teaching Assistant at University of Zurich. 9/2010-8/2016

Supervision and guidance: Stefan Naef, PhD student, MTEC ETH Zurich (co-authorship & guidance); Dmitry Plekhanov, PhD student, MTEC ETH Zurich (co-authorship & co-supervisor); Johannes Dahlke, PhD student, University of Hohenheim (co-authorship & guidance); Rafael Lorenz, PhD student, MTEC ETH Zurich (co-authorship & guidance), Florian Hulfeld, PhD student, KOF Swiss Economic Institute, ETH Zurich (co-authorship & guidance) and Master and Bachelor students at University of Zurich, and FFHS.

Placements of selected supervised or guided PhD Students: Dmitry Plekhanov, Associate Economic Affairs Officer, UNCTAD, Geneva; Johannes Dahlke, Assistant Professor, University of Twente.

Further grants and awards: Industry & Innovation **Best Reviewer Award** 2023, R&D Management Conference Trento 2022 **Best Paper Award**; R&D Management Conference Trento 2022 **Best Paper Award Nomination** and “honorably mentioned”; **Strategic Management Society SMS** London conference 2020 **Best Paper Prize Nomination** & Finalist SMS Corporate Strategy IG Best Paper Award; **Finalist** Kaja Rangus **Best Emerging Scholar Paper Award** from the University of California at Berkeley at the 6th Annual World Open Innovation Conference, 2019. Swiss-India Joint Research Program (10'000 CHF), several research travel grants of the Graduate School of Business, University of Zurich (à 2'000 CHF), the Swiss Academy of Humanity and Social Sciences (SAGW) (2'500 CHF), and of the Swiss National Science Foundation (2'500 CHF), Short-list Best PhD Dissertation Award 2017 International Society for Professional Innovation Management (ISPIM), Erasmus-fellowship Luiss Guido Carlo, Rome, Italy.

Main academic services, board memberships and expert evaluations: Ad hoc member of special education processes of the lectures' conference (ETH Zurich), ad hoc academic mid-level representative in appointment committee for professorships (ETH Zurich).

Member of program accreditation (FFHS), 2020.

Past member of the steering board of the PhD community at the International Society for Professional Innovation Management (ISPIM).

Invited referee for the Deutsche Forschungsgesellschaft (DFG), 2019.

Invited evaluation expert at the Division Research and Innovation, Ministry of Higher Education & Science, Denmark. 2018-2020.

Referee for the *Research Policy, Organization Science, R&D Management, Journal of Evolutionary Economics, Industry & Corporate Change, Economics of Innovation and New Technology, Industry & Innovation, European Management Journal, Research Evaluation, Journal of Technology Transfer, Technovation, Journal of Engineering and Technology Management, European Journal of International Management, Information Economics and Policy, Journal of Innovation Management; Swiss Journal of Economics and Statistics.*

Consulting services: The Danish Agency for Science, Technology and Innovation, Ministry of Higher Education & Science, Denmark, 2017-2020.

Research Associate at Innovative Partners Group AG (IMP). Innovation Think Tank. Switzerland, 2016-2018.

Organization of conferences and workshops: Co-Organizer of the PhD workshops: “Network your Way to Top Management Scholars” University of Zurich, September 6-8, 2012.

Annual conferences of the International Society for Professional Innovation Management (ISPIM). Member of the steering board of the PhD community.

Sports & Volunteering engagement: Organizing ski & snowboard camps at skiing club, Licensed Skiing instructor at Deutscher Skiverband e.V. & German Olympic Sports Confederation (Trainer B license).

Citizenship: Swiss, German.

Languages: German (mother tongue), English (C2), Italian (C1), French (C1, passive), Spanish (A2).

Scientific achievements

Selected scientific publications (peer reviewed)

- «Epidemic and Network Effects in the Diffusion of Emerging Digital Technologies: Evidence from Artificial Intelligence Adoption», (with Johannes Dahlke, Jan Kinne, David Lenz, Robert Dehghan, Martin Woerter, and Bernd Ebersberger). In: *Research Policy*, 53 (2). <https://doi.org/10.1016/j.respol.2023.104917> Impact Factor: 7.2 in 2023.

The properties of emerging, digital, general-purpose technologies make it hard to observe their adoption by firms and identify the salient determinants of adoption. However, these aspects are critical since the patterns related to early-stage diffusion establish path-dependencies which have implications for the distribution of the technological opportunities and socio-economic returns linked to these technologies. We focus on the case of artificial intelligence (AI) and train a transformer language model to identify firm-level AI adoption using textual data from over 1.1 million websites and constructing a hyperlink network that includes >380,000 firms in Germany, Austria, and Switzerland. We use these data to expand and test epidemic models of inter-firm technology diffusion by integrating the concepts of social capital and network embeddedness. We find that AI adoption is related to three epidemic effect mechanisms: 1) Indirect co-location in industrial and regional hot-spots associated to production of AI knowledge; 2) Direct exposure to sources transmitting deep AI knowledge; 3) Relational embeddedness in the AI knowledge network. The pattern of adoption identified is highly clustered and features a rather closed system of AI adopters which is likely to hinder its broader diffusion. This has implications for policy which should facilitate diffusion beyond localized clusters of expertise. Our findings also point to the need to employ a systemic perspective to investigate the relation between AI adoption and firm performance to identify whether appropriation of the benefits of AI depends on network position and social capital.

Recognition: **Best Paper Award** at R&D Management Conference 2022. **Notable conferences:** R&D Management Conference 2022, DRUID 2022, International Schumpeter Society 2021.

- «Radical or incremental: Where does R&D policy hit?», 2016 (with Cindy Lopes-Bento and Andrea Schenker-Wicki). In: *Research Policy*, 45(4), 869 -883. <https://doi.org/10.1016/j.respol.2016.01.010> Impact Factor: 7.2 in 2023.

This study investigates the impact and effectiveness of a public R&D support policy. In a policy design that aims at incentivizing radical as well as incremental innovations, we test where the policy impact is highest. While the privately motivated R&D expenditures are significant for both types of innovation, the policy-induced part is significant only for radical innovation. Furthermore, given that the funding agency encourages collaboration, and particularly industry-science collaboration, we further test whether effects are enhanced in collaborating firms. We do not find any evidence pointing to increased effects for the latter.

Recognition: Several media articles and interviews (NZZ, Austrian Council for Research and Technology Development). Citations in google scholar: 152

- «Cooperating with external partners: the importance of diversity for innovation performance», 2014 with Andrea Schenker-Wicki. *European Journal of International Management*, 8(5), 548–569. <https://doi.org/10.1504/EJIM.2014.064604> (Impact Factor: 2.29 in 2022)

This paper investigates how diversity in R&D cooperation networks affects firms' innovation performance output as measured by each firm's sales share of innovative products. To address this question, the authors analyse a large-scale sample of micro-data on Swiss firms from five waves (1999, 2002, 2005, 2008 and 2011) of the Swiss innovation survey using panel data analysis. The findings suggest that firms with greater diversity in their cooperation network benefit by generating new product innovations and that the diversity benefit is greatest for small firms. The study further detects a curvilinear relationship between diversity of collaborator types and innovation performance, and emphasises the importance of appropriate HRM and knowledge management policies and practices in providing firms with an effective mechanism for maximising the benefits from diversified cooperation networks.

Recognition: Citations in google scholar: 67

- «Structural Analysis of System Dynamics Models» (with Lukas Schoenenberger, Alexander Schmid, Radu Tanase and Markus Schwaninger), at *Simulation Modelling Practice and Theory*, 110(April), 102333. <https://doi.org/10.1016/j.simpat.2021.102333> (Impact Factor: 4.20 in 2022)

There is a significant leap from qualitative system dynamics, i.e., causal problem mapping, to quantitative system dynamics, where model relationships need to be mathematically formalized and parameter values must be estimated. While the former is quite intuitive, accessible, and manageable with limited resources, the latter in contrast demands sophisticated analytical and modeling skills and requires a relatively large budget of resources. Consequently, policy as well as decision-makers, often poorly trained in mathematical modeling and having restricted resources, refrain from using quantitative system dynamics. Instead, they prefer applying qualitative system dynamics to their complex strategic issues. However, modeling complex strategic issues by means of qualitative system dynamics only and exclusively, bears the risk of generating weakly validated and potentially misleading results. Therefore, we propose an intermediate phase in the system dynamics modeling process to close the gap between qualitative and quantitative system dynamics. In that intermediate phase, concept models emerging from qualitative system dynamics, are comprehensively analyzed based exclusively on their structure. We introduce a suite of tools for the algorithmic detection of high-leverage points, intended and unintended consequences thereof, and system archetypes in system dynamics models. We illustrate the benefits and restrictions of these tools by analyzing the third-order PLUM Model and the fifthorder World2 Model. Beyond system dynamics, these tools might also be applied to cognitive maps or other causal models.

Recognition: Among top 8 downloaded paper in *Simulation Modelling Practice and Theory* (August 2022).
Notable conferences: European Conference on Operational Research, International Conference on Complex Systems.

Publications in edited volumes

- «Zurich Innovation System», 2022, with Ludovit Garzik. In L. Garzik (Ed.), *Successful Innovation Systems: A Resource-oriented and Regional Perspective for Policy and Practice* (pp. 319–339). Springer International Publishing. https://doi.org/10.1007/978-3-030-80639-2_17
- «Leveraging Open Innovation through Social Media: A Study on Geneva based SMEs», 2020, with Angela Bacchetta Beckh and Patrick-Yves Badillo. In: Barlatier, P.-J., Mention, A.-L. (Eds.), *Managing Digital Open Innovation, Open Innovation: Bridging Theory and Practice*. Chapter 18. World Scientific. doi:10.1142/11794

Papers in advanced stages of the publication process

- «Productivity effects of IT investments: the role of innovation and competition» (with Dmitry Plekhanov, Torbjörn Netland, and Martin Woerter, Revise & Resubmit in *Management Information Systems Quarterly*

Prior research on the business value of digital technologies has identified a link between IT investments and productivity outputs. Yet, precise mechanisms and conditions for firm-level productivity effects of IT investments remain underexplored. By leveraging firm-level observational data on the digital transformation and innovation consisting of 1,183 firm-year observations from large firms and SMEs between 2002-2017, we provide more evidence about the causal relationship between IT investments and firm-level productivity. By applying dynamic panel estimations, we show that IT investments cause significant positive productivity-enhancing effects in high price competitive markets with few principal competitors, if firms exceed their rivals both in their capabilities to invest in IT and their innovation capabilities to generate sales from radical product innovations. In contrast, in high price competitive markets with many principal competitors, we find significant negative effects for this relationship. In these markets, positive stand-alone deviations in IT investment still matter for firm-level productivity. In line with the Red Queen Effect theory, we provide strong empirical evidence that not only does differentiation from competitors in volumes of IT investments matter, but also the directionality of strategic actions. Firms need to be fundamentally different in the quantities of IT expenditures and their application to capture productivity gains. Notable conferences: Submitted to International Industrial Organisation Conference (2022), DRUID (2022), R&D Management (2022).

Recognition: **Best Paper Award Nomination** at R&D Management Conference 2022. Notable conferences: Strategic Management Society Annual Conference 2023, Annual Meeting of Academy of Management 2023, OECD workshop 2023, R&D Management Conference 2022, DRUID 2022, Munich Summer Institute 2022

- «When Outsourcing Hurts a Firm’s Capability to Create Value from Product Innovation» (with Stefan Naef, Martin Woerter and Stephan Wagner), in preparation to *Journal of Management*.

The boundaries of the firm shape the development of the firm’s capabilities and its accumulation of knowledge. Changes in the firm’s boundaries therefore affect the way in which it creates value in the long term. Focusing on outsourcing, we explore the effects on value creation through product innovation. To substantiate our knowledge-based explanation for these effects, we identify knowledge relatedness of the outsourced activities and the firm’s absorptive capacity as drivers of the effects of outsourcing on innovation performance. We test our hypotheses in a first-differencing model using panel data for Swiss manufacturing firms. Our results show that outsourcing can cause a decline in the subsequent performance of new products. The magnitude of the outsourced activities drives these effects.

Notable conferences: Strategic Management Society SMS London conference 2020 **Best Paper Prize Nomination; Finalist SMS Corporate Strategy IG Best Paper Award; Finalist Kaja Rangus Best Emerging Scholar Paper Award** from the University of California at Berkeley at the 6th Annual World Open Innovation Conference, 2019; DRUID Conference 2021.

- «Digitalization as a driver of open innovation: Influence of external knowledge search strategy and appropriability concerns », with Stefan Naef, and Martin Woerter,

Increasing digitalization can support firms’ open innovation efforts (Gómez, Salazar, & Pilar, 2017; Kleis, Chwelos, Ramirez, & Cockburn, 2012). More efficient search and exchange of relevant knowledge, tools for collaborative knowledge management, and technologies that support an integrative innovation process are some of the IT that promote the open innovation process. While the benefits of opening up the innovation process are manifold, with higher levels of openness, the costs and risks of open innovation also increase to dominate the benefits. There is ample evidence that IT helps make open innovation activities more efficient. There is little knowledge, however, about whether IT helps firms push the limits imposed by the increasing costs and risks associated with high levels of openness. We clarify whether by investing in IT, firms can overcome some of these constraints and increase openness and open innovation performance. We test our hypotheses in a dynamic panel model for Swiss manufacturing firms. Our results show that the combination of IT investment and openness in terms of external knowledge search depth can increase innovation performance. This effect is restricted to firms that are exposed to low imitation threats and benefit from a high effectiveness of knowledge protection mechanisms.

Notable conferences: R&D Management Conference 2023.

- «Performance feedback signals from multiple reference groups: The case of Organizational Transformation», work in progress with Uriel Stettner, Georg von Krogh, and Martin Woerter. Final steps before submission to a top-tier general interest journal.

This study examines the role of utilizing multiple and complementary sources of performance feedback when managers assess their own organizational performance during fundamental organizational transformations. Unlike “tame” organizational changes that are definable and consensual, complex transformations that simultaneously affect structures, processes, and systems and are thus inherently difficult to define and address. Such transformations are subject to unpredictably shifting requirements, incomplete information, and unforeseeable outcomes. Their wicked character reflects high volatility, uncertainty, complexity, and ambiguity, making normative peer-based performance feedback signals incomplete to guide transformation. Whereas peer-based performance feedback signals tend to be coherent in tame contexts, they become increasingly noisy during wicked transformations, weakening their reliability, and rendering them incomplete. The incompleteness of signals challenges key decision makers to construct a relevant transformation-based reference group to benchmark organizational performance against and remain competitive. We develop a theoretical framework that includes multiple-reference-groups in which feedback from a transformational-reference-group complements performance feedback from a peer-reference-group to address the challenge of organization’s subjective performance assessment during transformative organizational change. It suggests that multiple complementary reference groups that encounter similar challenges and have a larger and more heterogeneous composition than immediate peers, offer distinct and relevant feedback for managing complex organizational transformations. Using a cross-industry sample of approximately 2050 organizations from the Swiss Digitalization Survey (2016–2020), we hypothesize and find that the probability of an increase in a manager’s perception of the organization’s competitiveness exhibits a curvilinear association with the complexity of the organization’s organizational transformation. This probability declines as the organization’s internal barriers to digital transformation increase. However, the effect of the wickedness of digital transformation on the manager’s perceived competitiveness of an organization strengthens when the organization faces fewer barriers to transformation than their Transformational reference group. Our study underscores the importance of

multiple complementary reference groups and promotes reference point theory and learning from performance feedback in the management of wicked problems.

- «One size fits all? Innovation, partner configuration and partner adaptation in R&D alliances» (with Cindy Lopes-Bento)

An important part in orchestrating innovation activities concerns the way in which firms configure and adapt their organizational boundaries with external collaboration partners to enhance their innovation performance. Past literature on strategic alliances has suggested that the type of partner a firm engages with to insource new knowledge may have an important impact on subsequent innovation success. Based on these insights, the current paper analyses what partner type configuration is appropriate for what type of innovation and firm size. It then goes on to analyzing how such partner configurations need to be adapted in order for the mix to always be beneficial for firms' innovation outcome. Using a large-scale sample, this paper finds that a complementary configuration of partner types and a dynamic adaptation thereof is important to ensure firm innovation success. It further elaborates that the adaptation differs depending on firm size and innovation type.

Notable conferences: International Industrial Organization Conference, Boston 2019; International Schumpeter Society, Seoul; DRUID, NYU, New York.

Knowledge transfer-oriented projects (between academic research and policy makers):

- **Digital transformation: how it changes organizations, performance, and markets**, funded by the National Research Programme, Digital Transformation (NRP 77). 2020-2025. Grant 435'837 CHF

The project aims to identify mechanisms underlying successful digital transformation in companies and to determine how digitization affects business performance and market dynamics. The aim is to provide policymakers with the basis for evidence-based recommendations for action.

Impact:

- Applicant's specific contribution: **Principal investigator**.
- The project deals with the following questions:
 - What is the status of digital transformation in Swiss companies? With which processes and skills do they adapt to the Digital Transformation?
 - What effects does digital transformation have on the performance of companies?
 - What are the consequences for market dynamics? Are digital technologies changing the competition?
- Data-Set: Analysis of the digital transformation, panel 2005-2021, with Andrin Spescha, and Martin Woerter; available at KOF ETH Zurich.
- Scientific output:
 - Epidemic and Network Effects in the Diffusion of Emerging Digital Technologies: Evidence from Artificial Intelligence Adoption», (with Johannes Dahlke, Jan Kinne, David Lenz, Robert Dehghan, Martin Woerter, and Bernd Ebersberger). In: *Research Policy*, 53 (2).
<https://doi.org/10.1016/j.respol.2023.104917>
- Work in progress:
 - «Productivity effects of IT investments: the role of innovation and competition», with Dmitry Plekhanov, Torbjörn Netland and Martin Woerter. R&R in *MIS Quarterly*
 - «Digitalization as a driver of open innovation: Influence of external knowledge search strategy and appropriability concerns», with Stefan Naef, and Martin Woerter.
 - «Performance feedback signals from multiple reference groups: The case of Organizational Transformation», work in progress with Uriel Stettner, Georg von Krogh, and Martin Woerter.
 - «Digital technology and firm performance: The power and perils of environmental complexity and institutional logics». Work in progress with Johannes Dahlke, and Martin Woerter.
 - «The role of Artificial Intelligence for innovation outcomes». Work in progress with Georg von Krogh, Uriel Stettner, Konstantinos Trantopoulos, and Martin Woerter.
- Media (TV, print, online)
 - “Artificial intelligence has the potential to revolutionise economic research”: ten questions for ChatGPT. In: *KOF Bulletin*, 173, 2023. With Hans Gersbach.
 - Digitalisierung in KMU: Potenzial wird oft nicht ausgeschöpft. *Die Volkswirtschaft*, 2023. 18. April. With Johannes Dahlke, Martin Wörter.
 - SRF 1, Tagesschau Hauptausgabe (TV news) | [Cyberangriffe kaum versicherbar](#) | 29.12.2022
 - [srf.ch | Cyberversicherungen sind sehr beliebt](#) | 30.12.2022
 - TagesAnzeiger. [In der Schweiz boomt das Geschäft mit der Cloud](#) | 10.10.2022.
 - SonntagsZeitung | [Die Informatikbranche überholt die Schweizer Banken](#) | 2.10.2022.

- **Analyse der Digitalisierung in der Schweizer Wirtschaft**, funded by SQS (Schweizerische Vereinigung für Qualitäts- und Management-Systeme (SQS)). 2018-2020. Grant 90'000 CHF

In this study we compiled a comprehensive picture of the adoption and distribution of digitalisation in Switzerland in general and in selected industries. The study examines the areas of the company in which digitization is increasingly being used. The evaluation is carried out according to selected industries as well as within industries according to different size classes. In a further analysis step, the (causal) relationships between various factors were identified on the basis of econometric estimations. This allows a better understanding of the impact of digitization on Swiss companies. In particular, the relationships between digitization and the competitiveness and productivity of a company were examined, taking into account, for example, the innovative strength of a company, IT security measures, and adaptations of the organizational practices. Companies want to increase their productivity by investing in digital technologies. However, this can only succeed if companies are innovative, adapt their organizational processes and invest in IT security. In general, Swiss companies seem to underestimate the potential of digitalization, as our study shows.

Impact:

- Applicant's specific contribution: **Principal Investigator**.
- Reports:
 - Beck, M., Plekhanov, D., Wörter, M., 2020. **Analyse der Digitalisierung in der Schweizer Wirtschaft**. KOF Studies (153). <https://doi.org/10.3929/ethz-b-000432882>
 - Beck, M., Lehmann, S. and Wörter, M., 2021. **Digitale Investitionen und Produktivität: Die Rolle von Innovation, Unternehmensorganisation und IT-Sicherheit**. In: KOF Analysen: no. 3, pp. 79-95, Zurich: KOF Swiss Economic Institute, ETH Zurich, 2021. DOI: 10.3929/ethz-b-000508432
- Media articles:
 - Digital investment pays off – but only if companies change their organisational structures. In: KOF Swiss Economic Institute | ETH Zurich Bulletin, No. 149, March 2021. <https://kof.ethz.ch/en/news-and-events/kof-bulletin/kof-bulletin/2021/03/Digital-investment-pays-off-but-only-if-companies-change-their-organisational-structures.html> (accessed 27.11.21)
 - Digital investment alone is not enough: innovation is also needed. In: KOF Swiss Economic Institute | ETH Zurich Bulletin, No. 147, January 2021. <https://kof.ethz.ch/en/news-and-events/news/kof-bulletin/kof-bulletin/2021/01/Digital-investment-alone-is-not-enough.html> (accessed 1.23.21).
 - IT security raises productivity – In: KOF Swiss Economic Institute | ETH Zurich Bulletin, No. 143, September 2020. <https://kof.ethz.ch/en/news-and-events/news/kof-bulletin/kof-bulletin/2020/09/IT-security-raises-productivity.html> (accessed 1.23.21).
- Media coverage: allnews.ch | [Investir dans la numérisation: avec l'innovation et la sécurité informatique](https://www.allnews.ch/story/investir-dans-la-numerisation-avec-linnovation-et-la-securite-informatique) | 04.09.2020
- moneycab.com | [KOF: Schweizer Unternehmen unterschätzen Potenzial der Digitalisierung](https://www.moneycab.com/news/kof-schweizer-unternehmen-unterschuetzen-potenzial-der-digitalisierung) | 04.09.2020
- punkt4.info | [KMU hinken bei Digitalisierung hinterher](https://www.punkt4.info/news/kmu-hinken-bei-digitalisierung-hinterher) | 04.09.2020
- Press Release: (4.9.2020) <https://kof.ethz.ch/news-und-veranstaltungen/medien/medienmitteilungen>

- **Knowledge and Technology Transfer in Switzerland**, funded by SERI (State Secretary for Education, Research, and Innovation). 2018-2020. Grant 200'000 CHF

The study has two main goals: i) Insights into the extent and development of KTT in Switzerland; (ii) Impact of the KTT on the innovation performance of the Swiss economy. Our study based on panel data shows that the WTT in Switzerland has the potential to significantly increase the innovation success of companies and their competitiveness. The universities (including the ETH and UAS sector) thus can make a social contribution, which goes beyond the pure training function and basic research.

Impact:

- Applicant's specific contribution: **Co-Project Leader**.

- Reports: The short version is published in the Report *Research and Innovation in Switzerland 2020*, published by SERI,
 - Beck, M., Hulfeld, F., Spescha, A., & Wörter, M. (2020). Analysis of knowledge and technology transfer in Switzerland – the perspective of the enterprises. In *Forschung und Innovation in der Schweiz 2020* (p. 382). Staatssekretariat für Bildung Forschung und Innovation SBFI. <https://www.sbf.admin.ch/sbf/de/home/forschung-und-innovation/forschung-und-innovation-in-der-schweiz/f-und-i-bericht.html>
 - Long version of the study: Beck, M., Hulfeld, F., Spescha, A & Wörter, M. (2020). Analysis of knowledge and technology transfer in Switzerland – the perspective of the enterprises. In: SERI series. <https://doi.org/10.3929/ethz-b-000412676>
- Data-set: Analysis of knowledge technology transfer, panel 2005-2018, with Florian Hulfeld, Andrin Spescha, and Martin Woerter; available at KOF ETH Zurich.
- **Danish-Swiss Impact Study of R&D performing SME's participating in the Eurostars innovation programme**, funded by SERI (State Secretary for Education, Research, and Innovation) and Innovation Fund Denmark. 2018-2020. Grant 150'000 CHF.

KOF ETH Zurich together with DAMVAD Analytics and B,S,S. Economic Consultants conduct a Danish-Swiss impact study of R&D performing SME's participating in the Eurostars innovation programme. The study produces robust quantitative evidence of the impact as well as insights about the effectiveness of the policy design of the program.

Impact:

- Applicant's specific contribution: **Principal Investigator**.
- Report is published by SERI and Innovation Fund Denmark. Beck, M., Hansen, J., Kaiser, B., Sonne-holm, P., & Wörter, M. (2019). *Eurostars The International Programme for Research Intensive SMEs: A Joint Swiss Danish Impact Study*. In: State Secretariat for Education, Research and Innovation (SERI) dossiers, Bern: 2019. <https://doi.org/10.3929/ethz-b-000413401>
- Final results presented to Innovation Fund Denmark and SERI at KOF ETH Zurich, 24. May 2019; Mid-level results presented on 6 July 2018 at Innovation Fund Denmark, Copenhagen, Denmark.
- Dataset: eurostars. Cross-sectional and panel data, 2005-2018. Pooled data comprised by EUREKA and FSO data (value-added, BZ/STATENT, R&D).
- Working paper (for scientific publication): work in progress with Boris Kaiser and Martin Woerter.

- **On the effects of research and development**, funded by: DASTI Danish Agency for Science Technology & Innovation, Ministry of Higher Education & Science, Denmark. 2016-2017.

It is important for a government to be well informed when it comes to prioritizing limited resources. For example, what is the best way to subsidize private research and development (R&D)? What is the effect of research-based education? Good decision-making is based on evidence, but it is unusual for policy questions to be informed by a single study. Solving complex real-life issues typically requires a huge volume of published research. This literature review summarizes the most recent high-quality research on the effect of public R&D investment and R&D policies on firm performance to help in decision-making and focus future research policies.

Impact:

- Applicant's specific contribution: Co-applicant
- Results presented to The Danish Council for Research and Innovation Policy, Copenhagen, Denmark, on 11. October 2016.
- Final report: **Beck, M.**, Junge, M., & Kaiser, U. (2017). On the effects of research and development: A literature review. <https://dea.nu/sites/dea.nu/files/on-the-effects-of-research-and-development-a-literature-review.pdf>
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