

Titel des Vorhabens: Taxation in the Era of Digitalization

Projektnummer/Aktenzeichen: K48/2017

Executive Summary

The aim of this interdisciplinary research network was to examine how digital transformation affects the functionality of tax systems. It extends the academic research in the fields of measuring digital transformation, identifying heterogeneous tax avoidance behavior and its competition implications, the behavioural effects of value added tax, and the digital opportunities for tax administration. Beyond research papers and academic outreach the network engages actively in tax policy debates framing the taxation rules for the digital era. The DigiTax consortium benefits from intense collaboration with the Leibniz Science Campus Mannheim Taxation and the DFG Transregio TRR 266 Accounting for Transparency.

During the funding phase, the researchers of DigiTax worked on research projects related to this aim and advanced the knowledge on digitalization and taxation in several respects. Our research projects are organized in 6 workpackages (WP). As can be seen from chapter 3 and the related excel file, DigiTax researchers have been quite active during the funding phase and successfully completed the projects defined in the application (there is some time lag for publication of international peer reviewed journals). To name some exemplary results, researchers involved in WP 1 developed new firm level indicators as a proxy for firms' digitalization. One indicator exploits a new dataset on granular technology usage and captures digital transformation at the firm level, i.e. digitalization of firms' business and management processes (Klein et al. 2020). A complementary indicator uses a novel text mining approach to derive real-time and large-scale predictions about firm digitalization based on firms' websites content (Axenbeck and Breithaupt 2022). In the subsequent WP 2, DigiTax researchers use the first indicator to revisit the existing evidence on international tax planning of multinational firms. Essentially, the study shows whether highly digitalized firms respond differently to tax incentives to shift profits to low tax jurisdictions (Klein et al. 2020). To complement these studies, DigiTax researchers (Spengel et al. 2018, Olbert et al. 2019) quantified and evaluated the existing tax incentives for the location of digital businesses. In an additional research project Klein et al. (2022) study the effect of digital tax measures on firm value. WP 3 investigates reactions towards non-profit taxes in digital markets and shows that consumption taxes have a significant impact for the behaviour of service firms (Olbert and Werner, 2020). WP 4 follows up on potential differences in tax responses (WP 2) by investigating their consequences in terms of competition distortions. DigiTax researchers provide new evidence on tax competition effects and employment (Glaeser et al. forthcoming). WP 5 addresses the question of how digital technologies can help tax administration and compliance. In cooperation with EnBW, DigiTax researcher accompany the digitalization of the tax department with academic insights. Furthermore, in cooperation with our partner KIT there is ongoing research activity on tax compliance as a value in sharing platforms. In particular, DigiTax researchers studied the implications of tax compliance labels for the behavior of platform users in an online experiment (Dann et al. 2022). Finally, DigiTax research provides important insights for an evidence based evaluation of the numerous tax policy initiatives addressing the digital economy (WP 6). To name some examples, DigiTax researchers were invited to participate in OECD working group meetings on the Inclusive BEPS Framework Pillar 1 and 2, provided written assessments on OECD consultations papers, wrote several policy briefs and presented their policy insights in front of different audiences e.g. at the German Federal Ministry of Finance or industry associations. Furthermore, the tax policy contributions on how to frame the taxation of the digital economy are frequently cited in press articles.

1. Achievement of objectives and milestones

The aim of the interdisciplinary research network DigiTax is to examine how digital transformation affects the functionality of tax systems. During the funding phase, the researchers of DigiTax worked on research projects related to this aim and advanced the knowledge on digitalization and taxation in several respects (see chapter 3). Numerous working papers, academic articles, and policy contributions make prove of a very vivid research activities across all workpackages defined in the application.

Beyond the publication of output as documented in the accompanying excel, important milestones were successfully reached. During the funding phase DigiTax researchers put forward two complementary indicators for firm level digitalization that are used in empirical research projects to capture firms' digitalization. They will of course also be part of future studies, e.g. in collaboration with the DFG TRR 266 Accounting for Transparency.

DigiTax Workshops were used to discuss research progress and stimulate the development of new ideas. Besides DigiTax Workshops, our researchers presented their work in progress also at the MannheimTaxation Annual Conferences 2018 - 2022 as well as at several Mannheim Taxation Campus Meetings.

1. Activities and obstacles

Our research projects were organized in 6 workpackages (WP). As can be seen from chapter 3 and the related excel file, DigiTax researchers have been quite active during the funding phase and published their results in academic journals, discussion papers or policy documents (see accompanying excel).

Researchers involved in this project met regularly in smaller individual working groups, present their research in academic seminars and are visible at well-known international conferences. Besides DigiTax Workshops, our researchers also benefitted from synergies with the MannheimTaxation Leibniz Science Campus and presented their work in progress also at the MannheimTaxation Annual Conferences 2018 - 2022 as well as at several Mannheim Taxation Campus Meetings. In our 2018 and 2019 DigiTax Workshops we also hosted practitioners from PwC Frankfurt to exchange our views on recent tax policy proposals addressing the digital economy. These discussions have been extremely fruitful for a view "behind the scenes" of taxation problems faced by increasingly digitalized firms. In addition, Prof. Spengel established a cooperation with the tax department of EnBW. The idea is to accompany the process of digitalization of the tax department with academic insights and to conduct case studies on the impact of digitalization. Finally, in cooperation with our partner KIT there is ongoing research activity on tax compliance as a value in sharing platforms.

DigiTax research provides important insights for an evidence based evaluation of the many tax policy initiatives addressing the digital economy. To name some examples, DigiTax researchers were invited to participate in OECD working group meetings on the Inclusive BEPS Framework Pillar 1 and 2, provided written assessments on OECD consultations papers, wrote several policy briefs and presented their policy insights in front of different audiences e.g. at the German Federal Ministry of Finance or industry associations.

1. Results and successes

Figure 1: Gantt Chart According to DigiTax Application

N°	Titel	1st year					2nd year					3rd year					Output	
		W					W	C				W			C	S		B
	Milestones						W	C				W			C	S	B	
	WP 1 Measuring digital transformation at firm level																	
T1.1	Micro data analysis																	Data
T1.2	Identifying typical business models																	Policy Brief
T1.3	Complementarity of ICT indicators																	Paper
	WP 2 Impact of digital transformation tax avoidance																	
T2.1	Heterogeneous profit shifting responses																	Paper
T2.2	Location of functions																	Paper
T2.3	Sensitivity towards countermeasures																	Paper
	WP 3 Tax effects of VAT in digital markets																	
T3.1	Destination-based nexus and location choices																	Paper
T3.2	Tax incidence in digital markets																	Paper
	WP 4 Digitalization, tax avoidance and competition effects																	
T4.1	Tax avoidance and gross-margins																	Paper
T4.2	Tax avoidance and price-cost margins																	Paper
	WP 5 Opportunities for digital tax administration																	
T5.1	Impact of digital tax administration																	Paper
T5.2	Prototype for tax analytics system																	Software
	WP 6 Assessing and developing tax reform proposals																	
T6.1	Synthesis of the empirical results																	Policy Brief
T6.2	Assessing the impact of countermeasures																	Paper
T6.3	Assessing fundamental reforms																	Paper
T6.4	Dissemination of blueprints																	Policy Brief

WP 1 conceptualizes and measure the degree of firms’ digital transformation at the micro-level. DigiTax researchers developed two complementary indicators to address numerous challenges in measuring digitalization at the firm level. The first indicator is survey based and relies on the CiTB Aberdeen Database (formerly Harte Hanks). Parts of this data have already been employed by other researchers and their results have been published in very renowned journals. Based on a strong cooperation between tax colleagues, colleagues from the Digital Economics department and our cooperation partner at the OECD we are now able to use the technology data to approximate the extent of digital transformation at the firm level. We see this indicator as a proxy for the digitalization of firms’ business and management processes. We presented the indicator and our estimations based on this indicator to the scientific community and investigated the specific information content of the newly developed indicator in comparison to existing measures (Klein et al. 2020). The second indicator (for German firms) measures digitalization of firms based on a novel text mining approach. DigiTax researchers show that advances in text mining and comprehensive firm website content can be leveraged to generate real-time and large-scale estimates of firm digitalization (Axenbeck and Breithaupt 2022). They illustrate the indicator’s potential for giving timely answers to pressing economic issues by analyzing the link between digitalization and firm resilience during the Covid-19 shock. Future work includes a comparison of both indicators and also a combination with an occupation based indicator. As a continuation of this successful project DigiTax researchers envision to also use the share of technology-related occupations („techies”) as a proxy for technology usage. Techies are the crucial link between economy wide technological progress and firm level technology adoption. The technical know-how required to implement new IT innovations is primarily embodied within the IT workforce in a firm.

In the subsequent WP 2, we use the survey based indicator (with worldwide coverage) to revisit the existing evidence on international tax planning of multinational firms. For this purpose we match the branch level IT sophistication indicator with financial information taken from the ORBIS database. Essentially, we study whether highly digitalized firms respond differently to tax incentives to shift profits to low tax jurisdictions. Our hypothesis is that firms which can be characterized by a high degree of IT sophistication have timely and structured access to any kind of information about their business transactions. Hence, their business can be managed more efficiently and it is also more likely that this information is used for tax

planning purposes. We also study to what extent firms characterized by a high degree of IT sophistication behave any different with respect to the newly introduced anti-avoidance measures (T.2.3). Our research on the tax sensitivity of digitalized firms provide important insights for numerous ongoing tax policy debates trying to combat aggressive tax planning.

To complement these empirical studies, DigiTax researchers (Spengel et al. 2018, Olbert et al. 2019) quantified the existing tax incentives for the location of digital businesses (this study is part of T.2.2). We identified and assessed relevant tax rules affecting domestic and cross-border digital business models across thirtythree countries. The computation of average effective tax rates is based on the neoclassical investment model of Devereux/Griffith. Our results help to evaluate tax-related location factors in the digital economy by combining the most relevant tax parameters and rules for taxable nexus in an objective measure. We find that investments in digital business models face generally lower average effective tax rates than those in traditional business models since a high share of investment costs is immediately expensed and a higher share of activities falls within the scope of countries' tax incentives for R&D input and/or output. While more generous depreciation rules for digital investments such as software make countries relatively more attractive, our results are mostly driven by statutory tax rates, special incentive schemes such as Intellectual Property (IP) Boxes, R&D credits, and super-deductions. Overall, we acknowledge an increasing trend in tax competition for digital businesses.

In an additional study (Klein et al. 2022) that goes beyond of what has been described in the application, DigiTax researchers study the effect of digital tax measures on firm value. By employing an event study methodology, we analyze investor reaction to the European Commission's proposals on the taxation of digital corporations. Examining the stock returns of potentially affected corporations surrounding the draft directives' release, we find a significant abnormal capital market reaction of -0.692 percentage points. The investor reaction is more pronounced for firms that engage more actively in tax avoidance, have a higher profit shifting potential, and for those with higher exposure to the EU. The market value of digital and innovative corporations decreased by at least 52 billion euro in excess of the regular market movement during the event window.

WP 3 investigates reactions towards non-profit taxes in digital markets (T3.1, T3.2). DigiTax researcher analyse the effects of consumption taxes for service firms (Olbert and Werner, 2020). Exploiting a unique setting in Europe with 30 staggered and plausibly exogenous value-added tax rate changes, the paper finds that multinational service firms report 0.5 percent less in sales if consumption taxes increase by one percentage point. Consistent with incentives for tax planning, the effect is stronger for firms with greater discretion over where to pay value-added taxes. In addition, it can be shown that service firms' profit shifting behavior depends on their responsiveness to consumption taxes.

In WP 4 DigiTax researchers provide new evidence on tax competition effects and employment (Glaeser et al. forthcoming). This study shows that the effects of tax competition on employment is greater for smaller firms, non-service firms, firms with fewer intangible assets and non-multinationals which lack the international tax planning opportunities and the geographic diversification to weather tax competition. Following up on potential differences in tax responses (WP 2) an ongoing and future research project aims at providing new insights into the question whether tax avoidance translates into competitive advantages and in particular whether this amplifies the growth of so called "super star firms" (T4.1 and T4.2). Put differently, to what extent do changes in profit shifting potential translate to higher or lower markups and how does this depend on the degree of technology usage.

While WP 2 to 4 mostly look at the challenges imposed by digital transformation on the viability of tax systems, WP 5 will address the question of how digital technologies can help tax administration and tax enforcement. So far, research related to WP 5 focuses on digitalization and tax administration (T5.1). Currently, two projects are underway that will provide absolutely new insights into this topic. Prof. Spengel established a cooperation with the tax department of EnBW. The idea is to accompany the process of digitalization of the tax department with academic insights and to conduct case studies on the impact of digitalization.

One of these studies focuses on implementing a fully digitalized process for the treatment of the real estate tax. In cooperation with our partner KIT there is ongoing research activity on tax compliance as a value in sharing platforms. Against the background that certain business models of online platforms facilitate tax evasion for service providers on their income earned on these platforms, DigiTax researchers study whether tax honesty constitutes a value for consumers at all. They employ an online experiment to monitor how potential consumers react to tax compliance labels. This study investigates the role of tax compliance for platform users by employing an online experiment. The results indicate that consumers perceive providers' tax compliance and consider it as a trust-enhancing signal. In further analysis, we find that consumers' moral norms moderate both the signal's trust-building effect as well as the relation between trust and transaction intention. In light of recent policy debates around taxing the platform economy, this study provides valuable practical insights for tax legislators.

The objective of WP 6 is to evaluate tax policy proposals addressing the digital economy, to identify new/alternative fields of action and to inform the debate based on the empirical findings of WPs 1 to 5. Several researchers of our consortium are engaging very actively in tax policy debates and have repeatedly been invited as experts for the taxation of the digital economy. In this report, we would like to provide a brief overview about the tax policy issues that have been addressed by DigiTax researchers. Already prior to the beginning of the funding phase, Olbert and Spengel (2017) show that the key pressure area for taxing digital businesses in the near future is transfer pricing. Drawing from practical case studies and research in industrial economics, accounting and management science, this article derives a concept for value creation in digital businesses. Based on this concept, the DigiTax researchers propose a framework to refine transfer pricing guidance in order to come closer to the goal of aligning profit taxation with value creation. Following up on the transfer pricing problem in the context of digitalization, Ludwig et al (2019) investigate how feasible the application of the arm's length principle is for data businesses. Based on survey evidence, Greil et al. (2019) evaluate the role of formulary apportionment for a reform of transfer pricing rules. Olbert and Spengel (2019) discuss data as a "new" value-driving asset in the digital economy. The paper draws on insights from interdisciplinary research to highlight that the value of data emerges through proprietary activities conducted within businesses. Spengel and Ludwig (2019) describe the problem of profit allocation in digital businesses and discuss ongoing OECD tax policy initiatives. Furthermore, DigiTax researchers engaged in the OECD consultation process on the Inclusive BEPS Framework Pillar I and II with written contributions and participation in working group meetings.

Based on a thorough assessment of the German AirBnB market Bräutigam et al. (2019) show that the estimated income tax and sales tax revenue derived from AirBnB transactions is substantial and put forward reform proposals that should help to effectively administer the taxation of income/revenue derived from services offered on online platforms.

As pointed out in WP 2, the study of Klein et al. (2022) reveals that expectations about ringfencing digital tax measures impact firm values. One important lesson learnt here is that tax policy proposals (even if not implemented) can have strong detrimental effects and should therefore be thoroughly evaluated and backed up with empirical evidence.

Finally, based on their research insights DigiTax researchers were repeatedly invited to present their tax policy assessments in front of different audiences e.g. at the German Federal Ministry of Finance or industry associations.

2. Chancengleichheit, Karriereförderung und Internationalisierung

For the DigiTax project and the MannheimTaxation Campus we recruited young researchers who have enjoyed a well-targeted taxation-related course program as part of the MannheimTaxation Tax Track at the University of Mannheim Graduate School of Economic and Social Sciences (GESS). The cohorts of PhD students on average reflect a good gender mix. Moreover, MannheimTaxation maintains a strong network with excellent researchers

worldwide and highly reputed international conferences. Both stimulate the international visibility and outreach of DigiTax. The junior researchers of DigiTax and MannheimTaxation were very successful with their submissions to highly reputed international conferences and could thus broaden their academic network. Moreover, during the funding phase two junior researchers were invited to Stanford Graduate School of Business, Stanford University for research visits. During their research stays (and beyond) they worked with DigiTax research partner Prof. Lisa de Simone (who is now at Associate Professor of Accounting at the McCombs School of Business, University of Texas at Austin) and Prof. Rebecca Lester (Stanford).

3. Strukturen und Kooperationen

Our network of excellence brought together highly reputed international research partners from disciplines which are key for the full understanding of taxation in the digital age: ICT economists, tax economists, information scientists as well as researchers from business administration. This created an important academic value added for the design of the proposed research projects. Likewise, it ensured that the technological, economic and business-related aspects and constraints of taxation in a digitalizing economy are taken into account when developing reform proposals. A further feature of this network besides its interdisciplinarity is the strong links forged between European and US institutions with a particular technological orientation (e.g. Stanford), the involvement of the OECD as an important player in global tax coordination and a private sector company (PwC) with valuable insights into new digital business models. In addition EnBW was new to the network and cooperated with respect to the digitalization of tax compliance.

With respect to the effective governance of the research network, the division of tasks in the project plan (see Gantt chart) safeguarded both intense cooperation and a clear assignment of responsibilities. Each workpackage was headed by one of the principal investigators who coordinates the activity of partners involved. As shown in chapter 3 of this report, for each workpackage DigiTax researchers succeeded in delivering the proposed output/milestones and thus advancing the tax research on this topic. The strategic steering of the project was the responsibility of the project board which is composed of representatives from the institutional partners. The board's task is to verify the progress of the project across all the WPs, to decide on details of the major events, dissemination activities and policy initiatives. The DigiTax consortium benefited from intense collaboration with the Leibniz Science Campus Mannheim Taxation, also with respect to joint workshops, conferences, and dissemination events.

4. Qualitätssicherung

All DigiTax researchers were committed to the rules of good scientific practice. Furthermore, presentation of research projects at different stages of development, the discussion of methodologies and results with senior researchers of the consortium as well as the participation in international workshops and conferences with review process helped monitoring research progress. Research results were published e.g. in the ZEW discussion paper series and well-reputed academic journals. For publication in peer reviewed journals open access options were considered.

5. Zusätzliche Ressourcen

6. Ausblick.

Please refer to chapter 2 where we specify for each workpackage the upcoming specific research questions.