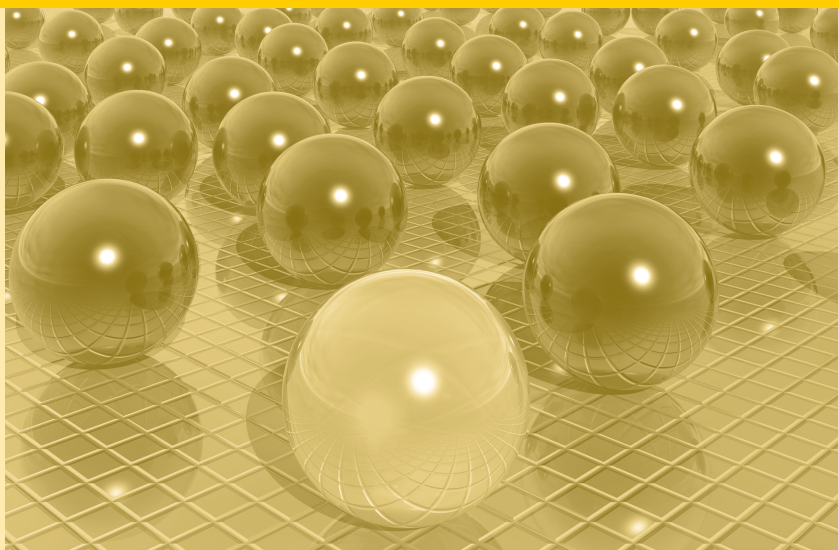


FDZ-Arbeitspapier Nr. 38



Decentralised Access to Confidential Microdata in Europe

Maurice Brandt, Patricia Eilsberger, Markus Zwick

2011

Impressum

Herausgeber: Statistische Ämter des Bundes und der Länder
Herstellung: Statistisches Bundesamt - Forschungsdatenzentrum -
Gustav-Stresemann-Ring 11, 65189 Wiesbaden
Telefon 0611 75-4220 • Telefax 0611 75-3915
Internet: <http://www.destatis.de>
E-Mail: forschungsdatenzentrum@destatis.de

Fachliche Informationen zu dieser Veröffentlichung:

Statistisches Bundesamt
Forschungsdatenzentrum

Tel.: 0611 75-4220
Fax.: 0611 75-3915
forschungsdatenzentrum@destatis.de

Informationen zum Datenangebot:

Statistisches Bundesamt
Forschungsdatenzentrum

Tel.: 0611 75-4220
Fax: 0611 72-3915
forschungsdatenzentrum@destatis.de

Forschungsdatenzentrum der
Statistischen Ämter der Länder
– Geschäftsstelle –
Tel.: 0211 9449-2873
Fax: 0211 9449-8087
forschungsdatenzentrum@it.nrw.de

Erscheinungsfolge: unregelmäßig
Erschienen im Juni 2011

Diese Publikation wird kostenlos als **PDF-Datei** zum Download unter www.forschungsdatenzentrum.de angeboten.

© Information und Technik Nordrhein-Westfalen, Düsseldorf, 2011
(im Auftrag der Herausbergemeinschaft)

Fotorechte Umschlag: © artSILENCEcom – Fotolia.com

Vervielfältigung und Verbreitung, nur auszugsweise, mit Quellenangabe gestattet. Alle übrigen Rechte bleiben vorbehalten.

Bei den enthaltenen statistischen Angaben handelt es sich um eigene Arbeitsergebnisse der genannten Autoren im Zusammenhang mit der Nutzung der bereitgestellten Daten der Forschungsdatenzentren. Es handelt sich hierbei ausdrücklich nicht um Ergebnisse der Statistischen Ämter des Bundes und der Länder.

FDZ-Arbeitspapier Nr. 38

Decentralised Access to Confidential Microdata in Europe

Maurice Brandt, Patricia Eilsberger, Markus Zwick

2011

Decentralised Access to Confidential Microdata in Europe

Maurice Brandt* ; Markus Zwick**

Abstract

In times of an increasing demand of microdata for scientific research, there is a need to discuss new and innovative ways which ease the access for researchers in the European Union. Most of the Member States already offer access to their national data; the access via a safe centre to the Community Statistics still has to be expanded. To improve the data infrastructure there are several aims in the EU. The goal of the ESSnet-Project "DECENTRALISED ACCESS TO EU-MICRODATA SETS" was to give a recommendation to set up a network of national safe centres to ease the access to the European Community Statistics based on the legal, technical and administrative feasibility. The paper will describe the framework, the objectives and the results of the project.¹

Keywords: Decentralised Access, EU-Microdata, Remote Access

Zusammenfassung

Aufgrund der steigenden Nachfrage nach Mikrodaten der amtlichen Statistik für wissenschaftliche Forschungsvorhaben entstand die Debatte, neuartige und innovative Datenzugangswege für Wissenschaftler der Europäischen Union (EU) einzurichten und zu vereinfachen. Die Mehrheit der Mitgliedstaaten bietet zwar national Mikrodaten an, ein Zugang zu den Daten der Gemeinschaftsstatistiken der Mitgliedsstaaten muss allerdings noch geschaffen werden. In der EU gibt es unterschiedliche Ansätze zur Verbesserung der Dateninfrastruktur. Das ESSnet-Projekt "DECENTRALISED ACCESS TO EU-MICRODATA SETS" hat sich zum Ziel gesetzt, Empfehlungen zur Bildung eines Netzwerks nationaler Gastwissenschaftlerarbeitsplätze zu geben. Dieses Netzwerk verfolgt den Zweck, den Datenzugang zu den Gemeinschaftsstatistiken unter Berücksichtigung der datenschutzrechtlichen, technischen und administrativen Gegebenheiten, zu vereinfachen. In dieser Veröffentlichung werden die Rahmenbedingungen, Zielvorstellungen und Ergebnisse dieses Projekts dargestellt.¹

Schlüsselwörter: Dezentraler Datenzugang, EU-Mikrodaten, Datenfernzugriff

*Federal Statistical Office Germany, e-mail: maurice.brandt@destatis.de

**Federal Statistical Office Germany, e-mail: markus.zwick@destatis.de

¹ This paper represents an extract of the final report of the ESSnet project "Decentralised Access to EU-Microdata Sets" (Brandt/Eilsberger, 2010). This paper is a reprint of the paper for conference "New Techniques and Technologies for Statistics" (NTTS) 2011.

1. Introduction

The informational infrastructure in the national Member States (MS), as well as the infrastructure in Eurostat referring to statistical information and data, has been improved over the recent years. It is now possible for researchers to access national datasets in several MS and also European datasets at Eurostat. The request for microdata develops more and more in direction of confidential microdata with rather slightly applied anonymisation procedures. Potentially, there are different ways for researchers to obtain access to confidential data. One feasible solution is the concept of so-called “guest researchers”, who are visiting the Research Data Centre (RDC) of the National Statistical Institute (NSI) to get access to microdata in a safe centre, which is a secure environment for datasets of official statistics.²

To access detailed European datasets there is unfortunately only one possibility for interested researchers. They have to visit the safe centre of Eurostat in Luxembourg. On the one hand it is certainly an advantage that the access is basically possible, on the other hand due to the local constraint it is also a barrier for some researchers. Thus, the data infrastructure for European datasets has to evolve to make it easier and more feasible for researchers to use the microdata at a European level. The idea is to develop a “DECENTRALISED ACCESS TO EU MICRODATA SETS” where upon a researcher from a certain MS can use European datasets in his own MS. The advantage of the network of safe centres would be that every single MS can widen the supply of microdata in the RDC, because in addition to the national dataset the researcher can use EU microdata. The concepts of the safe centres which are realized in the MS until now for using national datasets as well as the concept of the safe centre of Eurostat could be examples for the decentralised access to European microdata sets.

The goal of the project “DECENTRALISED ACCESS TO EU MICRODATA SETS” is to prove the feasibility of an access to European microdata in safe centres of the MS exemplarily for the ECHP data.³ The question is, whether the implementation of a network of safe centres in the MS is possible and what kinds of requirements are necessary for the procedure. According to this, a study of feasibility includes the methodology, guidelines and requirements which are essential to implement access to European microdata in safe centres of the MS. Based on these results the best practice solution for such an implementation could be focused in follow-up projects.

2. Contents of project

The project procedure contains different tasks. In order to achieve the objectives of this project, first it was necessary to present an overview of the current microdata access procedures in the different MS's, then to evaluate the actual situation with regard to Safe-Centres in the MS's. From a broad variety of models, a shortlist of viable possibilities for creating a European network of Safe-Centres was developed. Then, a detailed assessment of the pros and cons of the solutions on the shortlist was made with reference to the technical, legal and cost aspects of each solution. Based on these results, a guideline for European Safe-Centres was developed. It was also necessary to discuss whether the implementation of decentralised access to EU-microdata sets is practicable and which national legal frameworks in the

² For the solution in Germany see Bender et. al. (2010).

³ Co-partners of the project: Italy (Istat: Istituto Nazionale di Statistica), the Netherlands (CBS: Centraal Bureau voor de Statistiek), United Kingdom (ONS: Office for National Statistics), Hungary (KSH: Központi Statisztikai Hivatal), Portugal (INE: Instituto Nacional de Estatística) and the German federal state Nordrhein-Westfalen (IT.NRW).

European Statistical System (ESS) had to be taken into account. Further, to standardise and guarantee the anonymity of the outputs, an evaluation of the assignability of general rules of output checking to the ECHP data was also proven. All these led to the development of guidelines and documentation for the research use of Safe-Centres. In the context of the feasibility study a cost analysis for a future implementation was also included. In order to inform non-participating NSI's, the output from the project and national RDC's contact details will be made available at www.safe-centre.eu.

3. Results of project

3.1 Requirements for implementation a Safe-Centre

Besides the need to guarantee anonymity of the results, the legal framework includes special restrictions and conditions that have to be considered when providing access. As the study initially concentrates on implementing a network to access to the ECHP, it seems reasonable to prove whether the guidelines of Eurostat and the project partners are transferable for standardised criteria to build up an accreditation system. It turned out that there is a minimum legal bottom line, therefore the specifications on allowances and restrictions have to be defined:

- A Safe-Centre is defined as a secure room in a MS/Eurostat, especially designed for researchers. It is a place where researchers can access detailed confidential data under contractual agreements which cover confidentiality. The Safe-Centre itself would consist of a secure working and data storage environment in which the security of the data for research can be ensured. Both the legal and the IT aspects of security are considered here.
- For the implementation of a short term solution (see chapter 3) there are already guidelines of the security requirements for a Safe-Centre developed during the project, which can be a model for the minimum bottom line for the specifications of a Safe-Centre.

3.2 Possible network schemes

There are several NSI's in the European Member States that offer access to national microdata for researchers in RDC's. Eurostat currently makes microdata available for 12 European Community Statistics surveys⁴. Of these, detailed microdata at the Safe-Centre in Luxembourg are available for only two⁵, the others are released as highly anonymised licensed data sets. With respect to this, by now there was no need to implement any standardisation on dissemination, access and workflow procedures in general.

When considering potential schemes for implementing networked access to European Community Statistics a number of possible solutions were examined. The aim was to reduce the burden on Eurostat by finding a solution that considers the current legal constraints (especially for submitting and granting access to the data), and that makes use of existing access channels and data sources. The potential solutions were assessed against a range of criteria that were designed to take into account the simplicity of implementation. These criteria include: practical implementation in terms of RDC administration; technical capability (existing IT environment); legal constraints. After those solutions that were judged

⁴ European Community Household Panel, Labour Force Survey, Community Innovation Survey, Continuing Vocational Training Survey, Structure of Earnings Survey, European Union Statistics on Income and Living Conditions, Adult Education Survey, Farm Structure Survey, European Health Interview Survey, Community Statistics on Information Society – module 2 individuals, households and information society, Household Budget Survey, Statistical returns in respect of the Carriage of Goods by Road.

⁵ Community Innovation Survey, European Structure of Earnings Survey.

impractical or inadequate in relation to these criteria had been dropped, intermediate results of three possibilities were shortlisted. The likely costs and benefits of the three solutions were then considered and a matrix, identifying setup and ongoing issues for Eurostat and NSI's and whether these were complex or simple was then produced. The final result of this work is a hybrid solution where the most feasible parts of each solution on the shortlist are recognised. The outcome is ONE final solution which is foreseen for a practical implementation in a pilot study. The decision for the pilot study has been made on the three solutions that can be characterised as follows:

- **The fat centre** has little appeal. It is a potential short-term solution as the legal and administrative frameworks are in place, but this would require investment in IT infrastructure by Eurostat – and probably some investment by NSIs as well. More importantly, implementing the fat centre would require almost no changes to procedures. As a result, decentralised access could occur, but the incentives to consider better alternatives would be much lower than at present; hence, choosing this as the short-term solution would likely lead it to be also the long-term one. True international data sharing (including non-EU data) is unlikely to evolve in this environment. This approach has been discarded because it's less innovative and not future-proof.
- **The thin centre** is more appealing. The main downside is concern over the legal aspects – while there is the lawful authority for Eurostat to transfer data to NSIs in MSs, objections might be raised by member states which prevent the solution. Similar concerns might be raised over NSIs making decisions over applications, or clearance of outputs. The view was that these 'downsides' are actually positive aspects. Identification of the key behaviours that could be challenged is one of the main outputs of this report. The thin centre model forces hard questions to be asked, and allows for the answers to be tested in a real environment. It also has the advantage that it could be implemented relatively quickly from existing infrastructures. It was agreed that this model is the best for a **short-term solution** and therefore predestined for a **pilot study**.
- **The decentralised network** has several appealing features, but it was felt to require more experience and consideration to fully realise benefits – experience which could be gained through a well-designed pilot. It was agreed this should be considered as a potential model for a **long-term solution**.

3.3 The pilot – guideline for technical implementation

All three of the solutions on the short list have advantages and disadvantages. For most solutions there are practical barriers to overcome before they can be implemented. The realisation that all progress goes in small steps, led to a search for a short-term solution that will point the ESS in the right direction and can be implemented in the near future. The essential feature of the short-term solution is that it builds on existing infrastructures as far as possible, most of the administrative and supporting work currently carried out by Eurostat decentralised to local RDCs. The features of this short-term solution are described below; the necessary implementation actions can be found in table 1:

3.3.1 The application process

- The researcher applies for access at his local RDC. The local RDC then provides him with the standardised templates for access requests.
- Based on the filled out access requests, the local RDC checks the admissibility of the institute from Eurostat's list. It also makes a recommendation on the project proposal. In making this recommendation, the local RDC will follow rules and considerations that Eurostat imposes.

- In an ideal system, the RDC will make the decision itself, based upon agreed standards. However, under current legislation, MS need to be consulted for agreement to the proposal.
- The local RDC then takes care of the signing of the contract by the researcher. If necessary, it then sends the contracts to Eurostat to be signed by them.
- The local RDC explains the use of the facility to the researcher and instructs him on disclosure control issues.

3.3.2 The IT system

- Eurostat builds an IT system for a remote access via thin-client; it is envisaged that NSIs would be able to manage their own 'areas' of the central system, setup and manage accounts for researchers. NSIs need to have in place methods to access the central system.
 - In the absence of the above solution, the RDCs manage their own IT system. Existing centralised European infrastructures/processes would be used (CIRCA, eDAMIS, etc).

3.3.3 Data preparation

- Each country manages its own national area via remote access inside the European central data storage (imagine 27 different folders each with national microdata sets). Each MS gives -under its own decision- its own data to the researcher, by copying them to the corresponding user data area.
 - In the absence of the above solution, Eurostat transmits data to the RDC via eDAMIS; the RDC then moves the data into the researcher's local work area

3.3.4 Clearances

- The local RDC checks the output, making use of European guidelines, and makes decisions on its own authority
- Researchers get the results emailed to them and a copy is kept at the RDC
- If Eurostat is not willing to give up its authority, then it needs to set up a system to approve recommendations from RDCs. RDCs should be able to reject output by themselves, without reference to Eurostat
- A system for peer review is set up and actively carried out to ensure trust among NSIs in the way that output is being checked. Some proportion of outputs, is afterwards double checked by another NSI or Eurostat.

3.3.5 Keeping the administration up to date

- A central simple administrative system is available. Local RDC personnel can remotely log on to this system to add some basis information on the new contract (name of the institute, research aim, name of researchers, datasets used, start date, finishing date etc). This central administrative system could be placed on the central IT-system at Eurostat or for instance on CIRCA or a secure website.

3.3.6 Supporting countries without RDCs

- Countries without RDCs should be encouraged to either set up low-cost local systems or to investigate joint access with countries that can provide internet access to a safe centre.

Table 1 implementation actions

N°	Action	By whom
A	Ensuring compliance of local RDCs with basic standards	RDCs/Eurostat
B	Agreeing delegation of authority to and from Eurostat and MS	Eurostat/MS
C	Setting up an European centralised remote access via thin-client	Eurostat
D	Making templates for access requests to EU microdata	RDCs/Eurostat
E	Making a list of rules and considerations that need to be taken into account when making a recommendation on access	RDCs/Eurostat
F	Making a list of all institutes that are admissible available to NSI's	Eurostat
G	Describing the procedure for getting the contract signed by Eurostat, if needed	RDCs
H	Writing a user manual for the new remote facility to access EU microdata	RDCs
I	Setting up an easy, small scale administrative system to log all research on EU microdata + providing access to NSI's to this system	RDCs/Eurostat
J	Setting up a system of peer reviews of output checking	RDCs

Source: Authors' design

3.4 Long-term solution

At its simplest level, the short-term solution is designed to be up and running quickly with minimal investment. The long-term solution is less specific on implementation and more concerned with standards and process. The short-term model is seen as testing a concept which would be necessary for any long-term model; for example, the willingness of MSs to delegate authority to Eurostat and/or RDCs. If Eurostat would choose to build a remote access system as part of the short-term pilot, then this would be a useful indicator of how a long-term model might be implemented. However, given the range of experience across Europe in building thin-client systems, this seems a lower priority compared to resolving differences over process which could put the brake on any implementation.

In the long-term model, other issues need to be considered. How can metadata be developed usefully? How can research results be shared effectively? How do we ensure that RDCs learn from each other? Is there a benefit in a pan-European research databank? Could some form of secure 'cloud' or 'grid' computing replace single data cores? A decentralised system could pose difficulties in some of these areas. This does not necessarily mean that these developments are impossible; but there is currently limited experience in this area. A pilot using ECHP should also include reviewing some of the ways to improve knowledge sharing.

4. Outlook

The aims of this feasibility study have been accomplished. As a central result a network solution, which can be implemented very quickly, is recommended. The question whether additional ways of access to the community data in national NSIs are possible could be answered herewith. The follow-up project should deal with: the implementation of the remote access from safe centres in MS to the community statistics in Eurostat. The features of a technical realisation and the necessary implementation actions were elaborated in this feasibility study and provide a basis to set up a test-implementation in the near future. The debate on possible solutions for remote access gets more and more important and needs to be considered in future developments. For a quick, safe and easy manageable access to EU-microdata a modern way like remote access is indispensable for the scientific use. For such a system a future-proof tool for the European empirical science should be developed as soon as possible.

References

- Bender, S., Himmelreicher, R., Zühlke, S., Zwick, M. (2010): Access to microdata from official statistics. Building on progress. Expanding the research infrastructure for the social, economic, and behavioral sciences. Vol. 1, Opladen: Budrich UniPress, pp. 215-230.
- Brandt, M. & Eilsberger, P. (2010): *ESSnet Project "Decentralised Access to EU-Microdata Sets" – FINAL REPORT*.
- Brandt, M. & Zwick, M. (2009): *An informational infrastructure for the E-Science Age – On the way to remote data access for business data*, conference paper "New Techniques and Technologies for Statistics", Brussels.
- European Commission (2008): *Protection of Confidential Data at Eurostat*, Luxembourg.
- Eurostat (2007): *Handbook on Statistical Disclosure Control*. CENEX SDC. Luxembourg.
- Gotfried, A. & Pellegrino, M. (2008): *The Euro-SDMX Metadata Structure and Quality Indicators*, conference paper on Data Quality for International Organizations Eurostat, Luxembourg.
- Hundepool, A. & De Wolf, P. (2005): *OnSite@Home: Remote Access at Statistics Netherlands*, Monographs of Official Statistics, Luxembourg.
- Lenz, R., Vorgrimler, D. & Scheffler, M. (2006): *A Standard for the Release of Microdata*. RDC Germany Working Paper No. 7. Wiesbaden.

Bisher sind in der Reihe folgende FDZ-Arbeitspapiere erschienen:

Arbeitspapier Nr. 37: Masking Micro Data with Stochastic Noise, J. Höhne/ J. Höninger, Mai 2011

Arbeitspapier Nr. 36: Enthüllungsrisiko beim Remote Access: Die Schwerpunkteigenschaft der Regressionsgerade, A. Vogel, April 2011

Arbeitspapier Nr. 35: Temporary agency work and firm performance, S. Nielen/ A. Schiersch, April 2011

Arbeitspapier Nr. 34: Harmonisation of statistical confidentiality in the Federal Republic of Germany, M. Brandt/ A. Crößmann/ C. Gürke, März 2011

Arbeitspapier Nr. 33: Remote Access. Eine Welt ohne Mikrodaten ??., G. Ronning/ P. Bleninger/ J. Drechsler/C. Gürke, Januar 2011

Arbeitspapier Nr. 32: Compiling a Harmonized Database from Germany's 1978 to 2003 Sample Surveys of Income and Expenditure., T. Bönke/ C. Schröder/ C. Werdt, Mai 2010

Arbeitspapier Nr. 31: The Research Potential of New Types of Enterprise Data based on Surveys from Official Statistics in Germany., J. Wagner, Oktober 2009

Arbeitspapier Nr. 30: Geschlechterspezifische Einkommensunterschiede bei Selbstständigen im Vergleich zu abhängig Beschäftigten - Ein empirischer Vergleich auf der Grundlage steuerstatistischer Mikrodaten, P. Eilsberger/ M. Zwick, Januar 2008

Arbeitspapier Nr. 29: Reichtum in Niedersachsen und anderen Bundesländern - Ergebnisse der Steuergeschäftsstatistik 2003 für Selbstständige (Freie Berufe und Unternehmer) und abhängig Beschäftigte, P. Böhm/J. Merz, November 2008

Arbeitspapier Nr. 28: Exports and Productivity in the German Business Services Sector. First Evidence from the Turnover Tax Statistics Panel, A. Vogel, Juli 2009

Arbeitspapier Nr. 27: Künstler in den Daten der amtlichen Statistik, C. Haak, August 2008

Arbeitspapier Nr. 26: Union Density and Varieties of Coverage: The Anatomy of Union Wage Effects in Germany, B. Fitzenberger/ K. Kohn/ A. C. Lembcke, August 2008

Arbeitspapier Nr. 25: German engineering firms during the 1990's. How efficient are export champions?, A. Schiersch, Juli 2008

Arbeitspapier Nr. 24: Zum Einkommensreichtum Älterer in Deutschland – Neue Reichtumskennzahlen und Ergebnisse aus der Lohn- und Einkommensteuerstatistik (FAST 2001), P. Böhm/ J. Merz, Februar 2008

Arbeitspapier Nr. 23: Neue Datenangebote in den Forschungsdatenzentren. Betriebs- und Unternehmensdaten im Längsschnitt, M. Brandt/ D. Oberschachtsiek/ R. Pohl, November 2007

Arbeitspapier Nr. 22: Stichprobendaten von Versicherten der gesetzlichen Krankenversicherung- Grundlage und Struktur des Datenmaterials, P. Lugert, Dezember 2007

Arbeitspapier Nr. 21: KombiFiD - Kombinierte Firmendaten für Deutschland, S. Bender/ J. Wagner/ M. Zwick, November 2007

Arbeitspapier Nr. 20: Neue Möglichkeiten zur Nutzung vertraulicher amtlicher Personen- und Firmendaten, U. Kaiser/ J. Wagner, Juni 2007

Arbeitspapier Nr. 18: Die Gehalts- und Lohnstrukturerhebung: Methodik, Datenzugang und Forschungspotential, H.-P. Hafner/ R. Lenz, Mai 2007

Arbeitspapier Nr. 17: Anonymisation of Linked Employer Employee Datasets. Theoretical Thoughts and an Application to the German Structure of Earnings Survey, H.-P. Hafner/ R. Lenz, Dezember 2006

Arbeitspapier Nr. 16: Die europäische Union - Integration von unten oder Eliteprojekt? Eine Sekundäranalyse von Mikrodaten der amtlichen Statistik, R. Nauenburg, November 2006

Arbeitspapier Nr. 15: Keeping in Touch - A Benefit of Public Holidays Using German Time Use diary Data, J. Merz/ L. Osberg, November 2006

Arbeitspapier Nr. 14: Zur Konzeption eines Taxpayer-Panels für Deutschland, D. Vorgrimler/C. Gräßl/ S. Kriete-Dodds, November 2006

Arbeitspapier Nr. 13: Anonymisierte Daten der amtlichen Steuerstatistik, D. Vorgrimler, September 2006

Arbeitspapier Nr. 12: Mikrosimulation in der Betriebswirtschaftlichen Steuerlehre, R. Maiterth, August 2006

Arbeitspapier Nr. 11: Der Anteil der freien Berufe und der Gewerbetreibenden an der Gemeindefinanzierung, M. Zwick, September 2006

Arbeitspapier Nr. 10: Konstruktion und Bewertung eines ökonomischen Einkommens aus der faktisch anonymisierten Lohn- und Einkommensteuerstatistik, T. Bönke/F. Neher/C. Schröder, August 2006

Arbeitspapier Nr. 9: Anonymising business micro data - results of a German project, R. Lenz/ M. Rosemann/D. Vorgrimler/R. Sturm, Juni 2006

Arbeitspapier Nr. 8: Scientific analyses using the Continuing Vocational Training Survey 2000, R. Lenz/ H.-P. Hafner/ D. Schmidt, Juni 2006

Arbeitspapier Nr. 7: A standard for the release of microdata, R. Lenz/ D. Vorgrimler/ M. Scheffler, Juni 2006

Arbeitspapier Nr. 6: Measuring the disclosure protection of micro aggregated business microdata, R. Lenz, Juni 2006

Arbeitspapier Nr. 5: De facto anonymised microdata file on income tax statistics 1998, J. Merz/ D. Vorgrimler/M. Zwick, Oktober 2005

Arbeitspapier Nr. 4: Matching German turnover tax statistics, R. Lenz/ D. Vorgrimler, Juni 2005

Arbeitspapier Nr. 3: The research data centres of the Federal Statistical Office and the statistical offices of the Länder, S. Zühlke/ M. Zwick/ S. Scharnhorst/ T. Wende, März 2005

Arbeitspapier Nr. 2: Eine kommunale Einkommen- und Körperschaftsteuer als Alternative zur deutschen Gewerbesteuer: Eine empirische Analyse für ausgewählte Gemeinden, R. Maiterth/ M. Zwick, April 2005

Arbeitspapier Nr. 1: Ein Vergleich der Ergebnisse von Mikrosimulationen mit denen von Gruppensimulationen auf Basis der Einkommensteuerstatistik, H. Müller, März 2005

Stand: 20.06.2011

