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The German Microdata Lab at ZUMA: Services Provided to the Scientific Community

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The German Microdata Lab, located in the Centre for Survey Research and Methodology[1] (ZUMA), began its work in autumn 2003. This occurred in conjunction with a nationwide reorganization of access to research data, such that five other service and research centres were set up / established almost at the same time: at the Federal Statistical Office (in Wiesbaden and Bonn), the Statistical Offices of the German states, the Federal Labour Office, the Institute for the Study of Labour (IZA) in Bonn and the Association of German Social Insurance Bodies (Verband Deutscher Rentenversicherungsträger, VDR).[2] The goal is to make microdata gathered by official statistics agencies accessible and available to the empirically-oriented economic and social science research community. In what follows, we provide an overview of the historical development of access to official microdata in Germany, as well as a more specific examination of the work of the German Microdata Lab.

1. Historical Development

Official microdata were used in empirical research in Germany beginning in the 1970s, once data processing had reached a point where it was technically feasible to process the extensive microdata generated by the official sta-

1 The Centre for Survey Research and methodology is part of the "German Social Science Infrastructure Services e.V. (GESIS)". It provides services in support of social science research including the development and supply of databases with information on social science literature and research activities as well as the archiving and provision of survey data from social research. GESIS was established in 1986 and is divided into three local centres: the Social Science Information Centre (Bonn), the Central Archive for Empirical Social Research (University of Cologne) and the Centre for Survey Research and Methodology (Mannheim). GESIS is an institution of the "Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V.", a research organisation made up of 80 non-university research institutes and service facilities.

2 In addition to self-financing, the Centres are also supported by the Federal Ministry for Education and Research. Project financing for the German Microdata Lab is currently limited to three years.

tistics agencies. Initially, access to official microdata was relatively unproblematic. In the wake of public concerns about the potential misuse of such data that emerged in the course of planning the 1983 national census, however, access became sharply restricted. The 1980 Federal Statistics Law stipulated that the dissemination of individual-level data would henceforth only be possible for research under the condition that it was impossible to identify any individuals who had provided the information. In other words, the data had to be "absolutely" anonymous. This then resulted in statistics offices providing data about individuals only in the form of heavily aggregated tables, thereby sharply lowering the usefulness, for research or analytic purposes, of data presented in this form.

The revision of the Federal Statistics Law in 1987 improved matters again, inasmuch as it permitted passing on individual-level data from statistics offices to the academic community in a form that would take a "disproportionately large investment of time, money and labour" to establish which individuals had provided the information. This "factual anonymity" notion was then given practical form in a joint project undertaken by Mannheim University, ZUMA, the Federal Statistical Office, and the statistical offices of the various German states (Müller et al. 1991). For the first time it became possible to make a so-called Scientific Use File[3] of the Microcensus, along with other official data, available to researchers. Even so, this file was used by relatively few institutions, not least because the official statistics agencies charged such high fees for making the data available. With the financial help of the Federal Ministry of Education and Research, this cost problem could be resolved by the end of 1996.

This was only a partial solution, however, for it did not resolve the more fundamental issue of what the relationship was to be between official statistics and academic research, nor the more practical issue, now that the cost had been lowered, of how to institutionalise access to the Scientific Use Files containing official data. In answer, the Federal Ministry of Education and Research charged a commission in 1999 with the task of suggesting ways in which official statistics agencies could work with researchers more fruitfully with regard to content, resources, and institutional matters. This "Commission to Improve the Informational Infrastructure through Cooperation between the Research Community and Official Statistics" (Kommission zur Verbesserung der informationellen Infrastruktur zwischen Wissenschaft und Statistik: KVI), composed of representatives from official statistics agencies as well as researchers from the economic and social sciences, made a variety of suggestions that ran the gamut from institutionalising modes of cooperation to recommendations for individual surveys, methodological research, archiving, and data privacy. At its heart, however, stood access to microdata (KVI 2001).

[3] In contrast to the "absolutely" anonymous Public Use File.

As a first step in institutionalising cooperation between scientific research and the production and dissemination of official statistics, the Federal Ministry for Education and Research created an exploratory committee that suggested research data centres be established at the sites that produced the data, as well as service centres at several research institutions. Applications submitted by various institutions were then evaluated, and the committee subsequently recommended that the Federal Ministry fund several of them. The Ministry agreed, and that led to the official dedication of the centres noted above, among them the German Microdata Lab.

Many improvements have been made over the last few years with respect both to access and use of official microdata.[4] The results can be seen in Table 1 below, which provides a list of the available Scientific Use Files that use

Table 1

Currently Available Scientific Use Files Using Official Microdata

Employment Panel of the German Federal Labour Office	1998 – 2002 www.gesis.org / Dauerbeobachtung / Mikrodaten / Informationsquellen / weitere_Mikrodaten.htm#BA-Beschäftigtenpanel
German Sample of the European Community Household Panel (ECHP)	1994 – 1996 www.destatis.de / micro / d / micro_c3.htm
Income and Expenditure Survey	1993, 1998, 2003 www.gesis.org / Dauerbeobachtung / Einkommen / Daten / EVS / evs_index.htm www.destatis.de / micro / d / micro_c2.htm
IAB Employment Subsample	1975 – 1995 (Basic File), 1975 – 1997 (Regional File) www.gesis.org / en / data_service / iab / index.htm
Microcensus	1989, 1991, 1993, 1995, 1996, 1997, 1998, 1999, 2000, 2001 www.gesis.org / en / social_monitoring / microdata / data / department / microcensus / index.htm www.destatis.de / micro / e / micro_c1a.htm
Low Income Panel (Niedrigeinkommens-panel: NIEP)	1999 – 2002 www.gesis.org / Dauerbeobachtung / Mikrodaten / Informationsquellen / weitere_Mikrodaten.htm#Niedrigeinkommens-Panel
Time Budget Survey	1991 / 92 www.destatis.de / micro / d / micro_c4.htm

[4] Thanks to these various initiatives, the number of data users has jumped significantly in the last few years; about 130 institutes currently work with Microcensus Scientific Use Files.

official microdata. The specific work of the German Microdata Lab at ZUMA is examined in more detail below.

2. The German Microdata Lab (GML) at ZUMA

The efforts on the part of the (earlier incarnations of the) German Microdata Lab stretch back to 1986. The Wissenschaftsrat – an advisory body to the Federal Government and the State Governments – recommended establishing the Microdata Department at ZUMA to work on ways of utilizing official microdata in a manner appropriate to social science research. At the time, such official data was either wholly inaccessible to researchers or only accessible with difficulty, and the goal was to anchor such data into the infrastructure of German social science research. The task was justified in similar terms by the KVI in 2001: "It is important that services be provided and organized in a manner that is close to the needs of research. Developments in research can then be recognized in a timely fashion, and data and research service needs oriented accordingly. At the same time, it is necessary to maintain some distance from the data producers in order that the developments taking place there can been followed from a certain critical distance, as well as to enable research interests to be aggregated and articulated to the data producers" (KVI 2001: 34).

2.1 Research Services

Since the mid-1980s, the German Microdata Lab has focused its service efforts on the two large household samples provided by official statistics: the Microcensus and the Income and Expenditure Survey.[5] Both are very useful in finding data to answer questions posed in the economic and social sciences about the labour market, the demographic and social structure of society, income distribution or consumption patterns, or even forms of residential cohabitation. The regularity with which the data are gathered, as well as the consistency in question formulation, provide interesting opportunities for analyses of socio-economic change over time, given the data's longitudinal orientation. Though these samples are the main focus, the German Microdata Lab also makes official microdata more generally available to the economic and social sciences.

In conjunction with the KVI recommendations to expand the data infrastructure, the German Microdata Lab, working with official statistics agen-

[5] These data have been augmented by select official microdata generated by German Democratic Republic official statistics as well as from historical microdata. Our services to research are also oriented to making consumer panel data available, for example of the household and individual kind collected by the GfK Marktforschung (see http: // www.gfk.com; Papastefanou, 2002).

cies, has two foci in making new Scientific Use Files available in the short and middle term:

1. Expanding the potential use of both Microcensus and Income and Expenditure Survey in terms of chronology and content.

   To meet the needs of research for further data, we are making pre-1993 samples of the Income and Expenditure Survey, as well as pre-1989 Microcensus data, available. In addition, we are exploring the possibility for making regional files and panel files from the Microcensus available.

2. Supporting projects to increase the access to data for which there are, as yet, no anonymization procedures.

   To make new databases available, we will be working with researchers and the owners of these files to develop Scientific Use Files conceptualisations, and in particular bring our expertise in factual anonymization to bear. For example we are currently supporting the project entitled "Factual Anonymization of Individual-level Data from Economic Statistics" sponsored by the Federal Ministry of Education and Research and carried out by the Institute for Applied Economic Research (IAW, Tübingen) and the Federal Statistical Office (Statistisches Bundesamt 2003).

While these general services are directed toward primary access to the data, we also provide a comprehensive set of *Services for the Users of Scientific Use Files,* whether they stem from the Microcensus or the Income and Expenditure Survey, and do so in close cooperation with the Federal Statistical Office. Here the most important concern is to minimize the costs to individual researchers that are incurred in obtaining the information, in providing the basic knowledge of both content and methodology needed to work with the data, in data preparation and in data analysis – all of which with an eye to more efficiently using the data. Worth noting in this context are, among others, the following:

- developing means to make files available and discussing with the statistical agencies how best to implement them
- checking the consistency of the Scientific Use Files: this augments the data checks carried out by the statistics agencies, thereby making it possible to identify data problems and correct them even before the data is itself made available to users
- data preparation and documentation that corresponds to social science standards, such as preparing set-ups for creating files in the document format of standard software, calculating marginal distributions to check the raw data read in, as well as processing metadata found on the Web (such as questionnaires, data free descriptions, classifications und definitions provided by the Statistical Office)[6]

- providing aids for data analysis that help expand analytic potential, such as converting concepts, classifications, and scales that are standard in the field: in the process, the necessary coding routines are made available, thereby permitting theory-based social science classifications or scaling to be employed (e.g., microdata tools)[7]
- individual user consultation, providing guides to the data as well as suggestions for analysis, along with hints about particular problems that may arise when using official microdata
- special analyses for external researchers, as well as making it possible for guest researchers who are engaged in their own data analyses to enjoy research stays at ZUMA
- workshops und user conferences, whereby the latter in particular provides an opportunity not just for users to exchange information about experiences, but even for data users and data producers to compare notes.[8] The third Microcensus User Conference, held in conjunction with the Federal Statistics Offices, took place in October 2003.

We will continue offering these services, in accordance with the recommendations formulated by the KVI, and will expand our services as new Scientific Use Files become available. Official microdata carries with it a higher need for documentation, as the definitions and concepts employed therein frequently differ from the data gathered by social science research itself. It is a more pronounced need than for other kinds of data used by researchers engaged in secondary analyses. For many years now, and in cooperation with the Federal Statistical Office, the German Microdata Lab has provided comprehensive documentation on the Web, and the expansion of the databank-based MISSY information system (see 3.1) will enable us to expand this service still further.

2.2 Research and Development in the Interest of Better Service

A precondition for high quality service provision is independent research and development based on the microdata being made available. Not only does this mean a wider understanding of the relevant background for the data, useful for data users or consultation purposes, but it is also crucial for answering

6 On the Microcensus, see http: // www.gesis.org / en / social_monitoring / microdata / data / department / microcensus / index.htm.

7 See http: // www.gesis.org / en / social_monitoring / microdata / microdata%20tools / index.htm.

8 The papers and contributions to the Microcensus User Conferences are available under http: // www.gesis.org / Dauerbeobachtung / Mikrodaten / Veranstaltungen / index.htm.

questions concerning both theory and method. Research results, promulgated in the form of microdata tools, help expand the analytic potential of the microdata itself, or – as in the example of the methods project with respect to the Microcensus panels – may be connected with the release of new Scientific Use Files.

Current Microcensus research is concerned with the development of the social structure and with social inequality. Topics of ongoing and planned research include the development and determinants of ethnic inequality on the labour market, and household comparisons that focus on educational participation and social differentiation.[9] Current Income and Expenditure Survey research work places the social embedding of private consumption in the foreground. The methodological aspects concentrate on the comparability of income and consumption data in these samples (since 1962/63), as well as on data quality, and in particular, on missing values.

3. Current Projects at the German Microdata Lab

3.1 The Microdata Information System (MISSY)

MISSY stands for the Microdata Information System, a computer-based data bank which records information on social scientific microdata and makes it available online in systematized form. In the pilot project, only the Microcensus is included, though MISSY is designed to be able to integrate additional sources of data.

MISSY provides contextual information relevant to the Microcensus data in a systematized form for several reasons. First, contextual particulars underlying the data, if they exist at all, are often available only in printed form. Even then, individual researchers frequently have only partial access to this information. Second, the information itself is often not linked. Third, the underlying survey programmes of the available Microcensuses vary, making even those Scientific Use Files already accessible difficult to compare. Fourth, the simplifications necessary to ensure data anonymity result in changes to the variables themselves. Data users are thus faced with time-consuming preparations before they can even begin to think about starting to use the data.

Thus, by providing data-relevant information crucial to the analysis of official microdata in a systematic form online, MISSY significantly facilitates its use by researchers in the economic and social sciences. This system also makes a lasting contribution to the empirical work with official microdata.

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[9] On the research, see: http://www.gesis.org/en/social_monitoring/microdata/research/index.htm.

The MISSY work is subdivided into five aspects. The first, and most significant, is the collecting and connecting of data-relevant information. Expanding access potential, efficiently using data collected at multiple points in time, and increasing the effectiveness in ascertaining information are also important in making the MISSY user-friendly. Finally, efforts are undertaken to assist to document and archive older datasets.

3.2 Microcensus Regional Files

At the moment, the Microcensus is only available in the form of basic files. This format has the disadvantage that while high differentiation is provided at the level of topical variables (e.g. in occupational particulars), it is linked with low differentiation at the regional level (e.g. by community size or even entire German states). This makes basic files unsuited for the analysis of regional disparities or for analysing differing regional labour markets. Yet researchers have increasingly asked for just this kind of regional analysis from the Microcensus (see Falk / Steiner 2001: 38). In response, ZUMA, working in cooperation with the Federal Statistical Office and the Federal Regional Planning Bureau (Bundesamt für Bauwesen und Raumordnung, BBR), has been exploring ways to operationalize and develop Microcensus regional files (Wirth 2000), and has engaged in discussions with the relevant researchers. One suggestion has been to define regional units in the Microcensus as districts with a population of at least 100,000. To remain in accordance with data privacy laws (Federal Statistics Law) while at the same time maintaining regional differences to the greatest extent possible – so as, for example, to establish regional disparities with respect to job qualifications and chances on the labour market – the suggestion is to simplify occupational or sectoral characteristics at the regional level of analysis.

3.3 Microcensus Panel Files

The Microcensus is constructed as a rotating panel sample in which households in the enumeration district are questioned over a four-year time span, with one-quarter of the enumeration districts exchanged each year. However, persons and households that move out of the enumeration district are not followed and are instead replaced by the persons or households that have moved in (area sampling method).

However, statistics offices have been permitted since 1996 to again store the numbers assigned during sampling – necessary to know in order to link data – and have begun to construct panel files (Heidenreich 2002; Zühlke 2001). Many new possibilities for both content and methodological analysis

would have been made available through the dissemination of a Scientific Use File based on the sample of the Microcensus panels from 1996 – 99. Its size (the sample encompasses about 110,000 persons for four waves) can help compensate for the lack of longitudinal data in this area.

The preconditions for acquiring the data are to be established through a project designed to develop (and document) a reliable and valid procedure for linking longitudinal information. This project will also examine the possible bias that spatial mobility might introduce into the content of specific questions, and will suggest compensating weighting procedures as correctives. This will help ensure that Scientific Use Files containing panel data are used appropriately. As it is, the anonymization procedures used in preparing Microcensuses are applicable only to cross-sectional data, so it is necessary to develop similar procedures for longitudinal panel data. The development of such procedures will be pursued in the Microcensus Panel Project[10], to be carried out as a joint effort of official statistics offices and empirical research; one of ZUMA's roles will be to carry out selectivity analyses of specific questions.

3.4 The Preparation of Older Microdata

The KVI recommended that the retrospective acquisition and preparation of older microdata sets be made an urgent priority. In the case of the Microcensus, this would include the time before 1989, as no data in Scientific Use File form are currently available. In the Income and Expenditure Survey, which has Scientific Use Files available for data collected in 1993, 1998 and 2003, there are discussions about making the surveys collected from 1962/63 until 1988 accessible to researchers.

3.4.1 Microcensus

Microcensus data are a valuable source for long-term analyses, using cohort and longitudinal analyses, of social and economic changes in households and families. This is due in part to the continuous collection of data, since 1957, that employed a question format, which – at least in its core areas – has remained largely constant. As it was conceived as multiple-use sample, the Microcensus has also been able to collect information on numerous key societal topics. The inquiries, from which individual survey dates are to be selected, comprises the entire period from the first Microcensus in 1957 to the first Scientific Use File in 1989. A ZUMA project will address the question which

10 The partners in this project are the Federal Statistics Office, the Office for Data Processing and Statistics of North-Rhine Westphalia, the Freie Universität Berlin (Prof. Dr. U. Rendtel) and ZUMA.

specific time periods should be selected and which anonymization measures will need to be employed. Once the data files have been made available by the statistical office, comprehensive documentary material addressing the data as well as issues of comparability will be made available, in a manner similar to what is already done for the newer Microcensuses.

3.4.2 Income and Expenditure Survey

The Income and Expenditure Survey, conducted on a quinquennial basis since 1962/63, is an important data source for comprehensive depictions, or for longitudinal analysis, of the components of income and individual income tax, welfare contributions and benefits received, savings, and the structure and development of household consumption, all differentiated by socio-economic group. In addition to demographic information about the socio-economic composition of the households and their members, important aspects of wealth and debt – including the possession of durable goods – are also surveyed. The particular strength of this survey lies in its ability to connect social and economic situations on the one hand with consumption patterns on the other.[11]

A special research project, conducted jointly by the universities at Frankfurt and Mannheim, created a databank of variables extracted from the Income and Expenditure Survey for the entire period from 1962/63 through 1988. This databank, currently housed at the university in Frankfurt, is to be transferred to the research data centre of the Federal Statistical Office as well as ZUMA in order that this unique longitudinal dataset be made available to the research community. Once the data have been prepared as Scientific Use Files, ZUMA will provide documentation and tools to enable this resource to be utilized for comparative purposes.

4. Prospects

In its report, the KVI emphasized the exceptional importance official microdata has for the empirical economic and social sciences, and listed a variety of ways the infrastructure for providing data could be improved. Our considerations have focused here on access to microdata, but a foundation has been laid as well by the recommendation of the Federal Ministry for Education and Research that a "Council for Economic and Social Data" be brought to life. This would create the necessary infrastructure for working with official micro-

[11] As for the generalizability of the results, there are limitations with respect to the quota sample itself – there is the suspicion of a selectivity bias of unknown origin on the part of the participants – as well as under-sampling of the high income groups. On the other hand, no other databases are available to permit such questions of social change since the early 1960s to be traced and researched.

data, thereby enabling Germany to catch up with many other countries that already have such structures in place (see Mayer 2003). However, one should note that much remains to be done in terms of consolidation.

The new research data centres at the data production sites, established in accordance with international models, are to open up possibilities for research. These could include making more space for guest researchers, or expanding the possibilities for doing data analysis from afar, as well as data analysis of material that cannot be disseminated in the form of Scientific Use Files. From the viewpoint of economic and social science research, the development and dissemination of Scientific Use Files should have the highest priority due to "their flexibility of use. The anonymization guarantees, in a relatively simple manner, data protection and this solution also lowers the cost of data use" (KVI 2001: 270). Where possible, Public Use Files should also be made available.

In terms of official microdata, ZUMA will continue to support improving access to these data for research purposes, as well as ensure their best possible utilization. In addition to the improvements and expansion in the context of the Microcensus (incorporating older data, and improving regional and panel files) and the Income and Expenditure Survey, ZUMA has considerable expertise in establishing factual anonymity in projects that involve the inclusion of newer databases, including those that come from other producers of data. The services already provided to research, as in the cases of the Scientific Use Files of the Microcensus and the Income and Expenditure Survey, will be expanded, and the MISSY project in particular is intended to make the use of the Microcensus as a data source for social science research considerably easier, both in terms of content and in terms of methodology.

However, as is true in the research data centres with respect to the use rights on the part of researchers,[12] it remains the case that there are still restrictions placed on the use of Scientific Use Files. For legal reasons, these files cannot currently be supplied to researchers abroad. It is thus urgently necessary that revisions to the German Statistics Law be undertaken to bring Germany in line with the EU "Statistics Law" (Regulation Nr. 322/97 of February 17, 1997) and thereby not only make cooperative work with researchers abroad easier, but also to more readily be able to carry out internationally comparative analyses.[13]

As noted above, select microdata from the Microcensus, the Income and Expenditure Survey , the German Sample of the European Community Household Panel, and the Time Budget Survey, was made financially accessible

12 Further changes to the Federal Statistics Law would be necessary to change or lift the current restrictions on use (KVI 2001, 170 – 172), and thereby allow an accommodation to research needs.

13 For international aspects of access to public data, see OECD (2003).

with the help of the Federal Ministry of Education and Research. Yet against the background that current data are needed particularly in the realm of policy advice provided to decision-makers, it is very important that the statistics agencies and the Federal Employment Office also make current datasets available at an affordable cost, preferably as Scientific Use Files. The significance of official microdata for the analysis of society can be underscored by having current Scientific Use Files available. It can show at the same time that the expanding infrastructure and data dissemination efforts – for the moment only being supported on the basis of individual projects – urgently needs to be consolidated and secured.

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