Data Observer

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SOEP-LEE2: Linking Surveys on Employees to Employers in Germany

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Abstract: This article presents the new linked employee-employer study of the Socio-Economic Panel (SOEP-LEE2), which offers new research opportunities for various academic fields. In particular, the study contains two waves of an employer survey for persons in dependent work that is also linkable to the SOEP, a large representative German annual household panel (SOEP-LEE2-Core). Moreover, SOEP-LEE2 includes two waves of self-employed surveys based on self-employed in the SOEP-Core (SOEP-LEE2-Self-employed) and three additional representative employer surveys, independent of the SOEP in terms of sampling employers (SOEP-LEE2-Compare). Survey topics include digitalisation and cybersecurity, human capital formation, COVID-19, and human resource management. Here, we describe the content, survey design, and comparability of the different datasets in the SOEP-LEE2 to potential users in different disciplines of research.

Keywords: employment relations; human resource management; linked employee-employer data; SOEP; SOEP-LEE2; survey design

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1 Introduction

Research on relationships between employers and employees remains a field of central importance to society in general and research communities specifically. An example is the extent to which behavior at the job, job satisfaction, and wages of employees depends on establishment strategies, human resource management instruments, and investment decisions. The insights from such research are of particular interest in times of large reforms and transformations during crisis. In the German context, an example is the Hartz reforms constituting marked change in labor markets during the 2010s (e.g. Fahr und Sunde 2009; Bauer and King 2018). More recently, several major events shocked economies and employee–employer relationships in a polycrisis: the COVID-19 pandemic commencing toward the end of 2019 and the war in the Ukraine starting first quarter of 2022, which also led to a great wave of immigrants from Ukraine, as well as an energy crisis and rising inflation in Europe. A related and important source of transformations in employee-employer relationships is digitalisation, made eminent from e.g. lockdowns during the pandemic: Not only does digitalisation change business and production, but it also changes the work environment, tasks, and worker productivity.

The SOEP-LEE2 speaks to these different processes evolving over time from the perspective of establishments, the self-employed and linked employee–employer relations. It includes comprehensive individual and household characteristics from the SOEP (Goebel et al. 2019) alongside detailed employer information such as establishment characteristics, human resource management, training practices, continuing education, and digitalisation. It does so by linking survey information from employees in SOEP-Core to survey information of employers in an employee first approach resulting in the SOEP-LEE2-Core survey. The SOEP-LEE2 adds new linked employee–employer data for Germany and related data is found in a number of other countries (e.g. Greenan and Seghir 2016).

The SOEP-LEE2-Core of the SOEP-LEE2 data structure is an extension of the SOEP-LEE1 project of 2012 based on the employee first survey design (Weinhardt et al. 2016, 2017), while containing a new research focus on shocks to employee–employer relations from pandemics, conflicts, digitalisation, and cybersecurity issues. In addition, the SOEP-LEE2 data structure comprises a self-employed survey (SOEP-LEE2-Self-employed) with a sample derived from SOEP-Core and a supplementary representative establishment survey (SOEP-LEE2-Compare) based on a sample from the establishment register of the German Federal Employment Agency. The SOEP-LEE2 data structure covers the period from 2022 to 2024, which may be extended through 2026. The infas

Institute for Applied Social Science is responsible for implementing the surveys of the SOEP-LEE2 data structure.

The questionnaires are largely identical in the three surveys in the SOEP-LEE2 data structure – SOEP-LEE2-Core, SOEP-LEE2-Self-employed, and SOEP-LEE2-Compare – except for thematic rotating modules over the different waves and adaptations over time. The largely harmonized structure and content of the surveys allows in-depth analyses of the German labor market in times of consecutive crisis and transformation. In this sense, the SOEP-LEE2 complements existing studies in which individual/household data are linked to establishment data. The combined SOEP-LEE2-Core and SOEP-LEE2-Compare contains information for over 2000 employers in the first wave, while the SOEP-LEE2-Self-employed contains information for over 600 self-employed in the first wave. SOEP-LEE2-Compare is planned to contain three waves, while SOEP-LEE2-Core and SOEP-LEE2-Self-employed is planned to comprise two waves. For all, a possible extension of the project would add at least one wave.

Section 2 offers a presentation of the conceptual framework and interdependencies of the different parts of the SOEP-LEE2 data structure, while Section 3 give details on the topics covered in the questionnaire and on relations to previous established SOEP-LEE data and other employer surveys. Section 4 offers a discussion, while Section 5 finally contains references on how to obtain documentation of and data access to the SOEP-LEE2 data structure.

2 Conceptual Framework of the SOEP-LEE2 Data

The SOEP-LEE2 data structure consists of three related surveys, as shown in Figure 1. The SOEP-LEE2-Core survey, which builds on an employee first approach, uses contact data on employers for persons in dependent work obtained initially during the SOEP-Core survey procedure. Employed persons in dependent work within the SOEP-Core are asked about contact information to their employer (left-most red ellipse in Figure 1). For these employers, the relevant module of the questionnaire is that of the “General Employer Module” and they are offered to respond to the questionnaire given the number of employees is at least five.

The sample of self-employed persons for the SOEP-LEE2-Self-employed arrives from those persons in the SOEP-Core survey responding that they are self-employed. Those included in the SOEP-LEE2-Self-employed may be solo or non-solo self-employed. The relevant questionnaire is the baseline questionnaire of the “General Employer Module” – the yellow square in Figure 1 – modified to complement self-employed and so becomes the questionnaire of the “Self-employed Module”, i.e. the orange square to the left of Figure 1. Topics specifically relevant for this sample in the “Self-employed Module” are the company start-up period, investments, innovation,

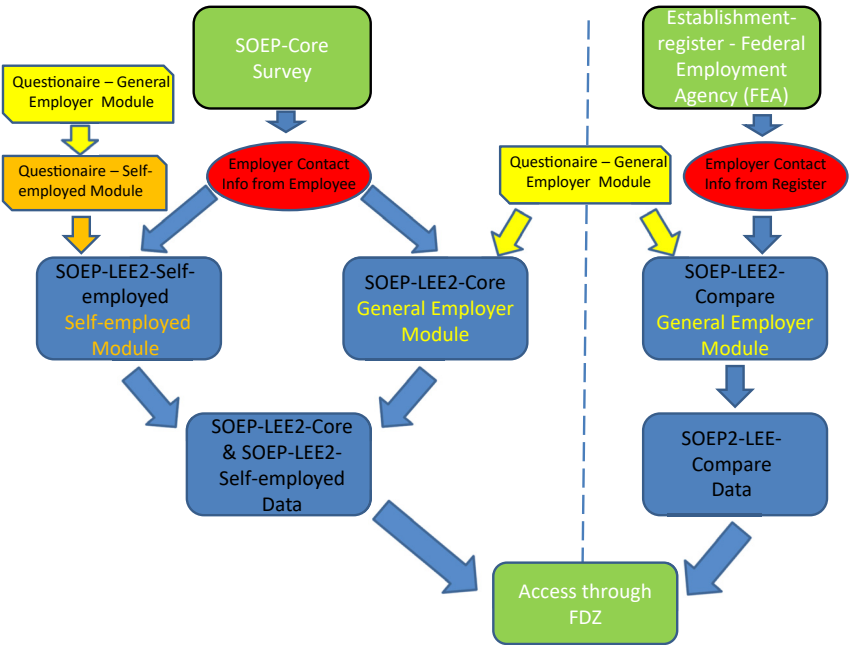

Figure 1: Conceptual framework for the SOEP-LEE2 data structure. Source: Figure by authors.

tasks of self-employed persons, retirement security, and challenges of self-employment. Questions concerning organizational characteristics, staff structure, consequences of COVID 19, and use of home office are the same in all three surveys. While this is the general structure of the SOEP-LEE2 data including relations between the different surveys and samples therein, details on survey design and included themes for the first wave are provided in Section 3.

A challenge in using the SOEP-LEE2-Core is that of an employee first survey design. Representativeness is maintained for employees by design, but this is not the case with respect to employers. To ensure a basis of comparison of the results from the SOEP-LEE2-Core survey, the SOEP-LEE2-Compare survey builds on a representative sample of employers from the establishment register of the German Federal Employment Agency. The sample of the SOEP-LEE2-Compare is stratified by five strata of establishment sizes, eight strata of business sectors, and two strata of geography. These employers are then asked to fill-in the same questionnaire as those in the SOEP-LEE2-Core, i.e. the "General Employer Module" in Figure 1. In this way, it is possible to assess, item-by-item, if the employee first sampling procedure of the SOEP-LEE2-Core implies selection and renders particular patterns of firm characteristics, when compared to the representative sample of the SOEP-LEE2-Compare survey.

SOEP-LEE2-Compare allows for multifaceted analyses of establishment reactions to the polycrisis without linking employers to employees. Being a representative survey of establishments in Germany, it allows assessments about how establishments handled COVID-19, the energy crisis, or adjoin to this pursue digitalisation.

Figure 2 shows the different waves of SOEP-LEE2-Core/SOEP-LEE2-Self-employed and SOEP-LEE2-Compare. Notice that the two last waves in the shaded blue areas of Figure 2 are conditional on a possible extension of the data collection. Two waves of SOEP-LEE2-Core and SOEP-LEE2-Self-employed and three waves of SOEP-LEE2-Compare are certain to be included in the data structure.

The planned survey periods for the SOEP-LEE2-Core are the first and second quarters of a year based on a sample from SOEP-Core of the previous year, while SOEP-LEE2-Self-employed is planned to be collected in the third and fourth

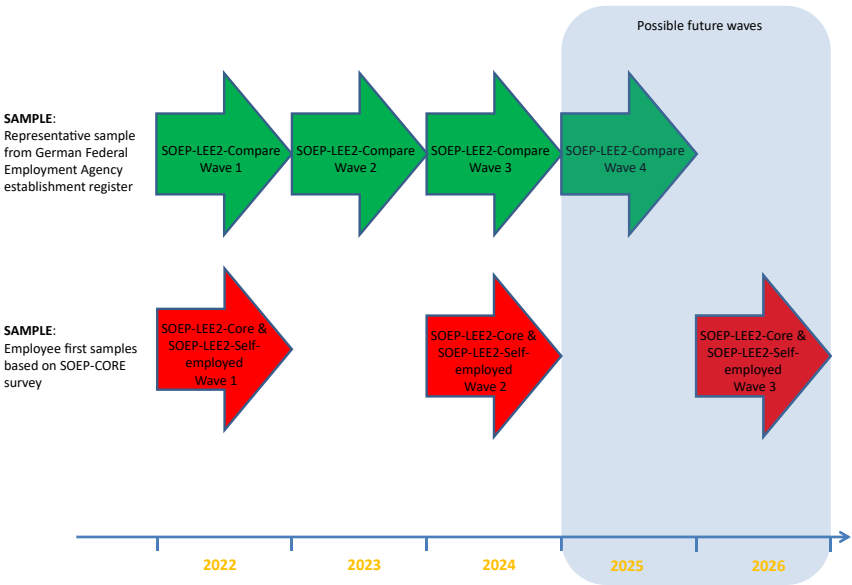

Figure 2: The waves of the SOEP-LEE2 data structure. Source: Figure by authors. Notes: Planned survey periods for SOEP-LEE2-Core are generally in first and second quarters in the year based on SOEP-Core of the previous year, e.g. the first wave of SOEP-LEE2-Core is collected in the first and second quarter 2022 based on a sample from the SOEP-Core in 2021. Survey periods planned for SOEP-LEE2-Self-employed is the third and fourth quarter in a year based on a sample from SOEP-Core of the same year. Survey periods planned for SOEP-LEE2-Compare is for the first two waves of surveying the last quarter in a year and first quarter of following year, e.g. the first wave of SOEP-LEE2-Compare is collected in the last quarter of 2022 and the first quarter of 2023. The two last waves of the SOEP-LEE2-Compare is collected in the last two quarters of a year, e.g. the third wave of the SOEP-LEE2-Compare is collected in third and fourth quarter of 2024.

quarters of a year based on a sample from the SOEP-Core of the same year. For the SOEP-LEE2-Compare, the planned periods of collecting data is the last quarter of a year and first quarter of the following, though deviating in case of a possible extension with more waves. For more detail, see the notes to Figure 2.

The main objective of the SOEP-LEE2-Compare is to establish a representative sample, which contains information for over 1500 employers in the first wave, who are provided with largely the same questionnaire as the employers in the SOEP-LEE2-Core. The first wave of the SOEP-LEE2-Core on the other hand has obtained employer contact data from employees for 5647 employers, which renders information on 743 employers for a subsample of employees in SOEP-Core after considering partial response and non-response. The sample of the first wave of the SOEP-LEE2-Self-employed contains over 1000 self-employed persons from SOEP-Core and a (partial) response from 632 self-employed. The SOEP-LEE2 data structure generally facilitates cross-sectional studies using the complete SOEP-LEE2-Core survey, SOEP-LEE2-Self-employed survey, or the SOEP-LEE2-Compare survey. However, SOEP-LEE2-Core may have features of a panel for the subset of observations where employees stay employed with the same employer over several waves and the employer keeps participating in the survey. The SOEP-LEE2-Self-employed have panel properties in the sense of having observations for the same self-employed person in the two waves given a self-employed participates in both waves of the SOEP-Core and responds to the questionnaire of the SOEP-LEE2-Self-employed in both waves.

The SOEP-LEE2-Core and the SOEP-LEE2-Self-Employed have two waves planned in 2022 and 2024, respectively, while the SOEP-LEE2-Compare has three waves planned. All have an additional wave in 2025 and 2026 shown as the shaded area of Figure 2 conditional on an extension. The first wave of SOEP-LEE2-Core, SOEP-LEE2-Self-employed, and SOEP-LEE2-Compare has been implemented and will be published simultaneously with SOEP-Core in 2023. In particular, the multiple waves of the different parts of the SOEP-LEE2 data structure allows for detailed dynamic assessments of the changing establishment practices that are observed in the representative sample of the SOEP-LEE2-Compare as compared to the employer first data of the SOEP-LEE2-Core. As such, the SOEP-LEE2-Compare accommodates needs for a precise assessment of changing patterns and practices among employers in-between the two waves of the SOEP-LEE2-Core. The self-employed survey also makes it possible to compare the practices (such as continuing education and home office use) and reactions to COVID-19 and the energy crisis of self-employed persons with those of establishments in the SOEP2-LEE-Core or SOEP-LEE2-Compare.

Having presented the conceptual framework of the SOEP-LEE2 data structure, we now focus on the survey design of the SOEP-LEE2-Core/SOEP-LEE2-Self-employed and SOEP-LEE2-Compare. This includes aspects of the survey design in terms of e.g. questionnaires, comparisons with the earlier collected SOEP-LEE1 data, and other business surveys.

3 Question Design and Comparability from SOEP-LEE2-Core/SOEP-LEE2-Self-employed and SOEP-LEE2-Compare

The SOEP-LEE2 data structure builds one largely unified questionnaire, which is used for both the SOEP-LEE2-Core and the SOEP-LEE2-Compare. The questionnaire of the SOEP-LEE2-Self-employed has themes specifically relevant for self-employed but also large overlaps with the questionnaires of the two other surveys. Specific topics from the self-employed survey are foundation phase, investments, innovation, tasks of self-employed persons, retirement security, and challenges of self-employment. This, on the other hand, leads to a reduction of other themes, while still maintaining a set of common questions across the questionnaires.

The questionnaire used in the first wave of the SOEP-LEE2-Core and SOEP-LEE2-Compare ("General Employer Module" in Figure 1) consists of 64 questions to employers providing information about the organization, management, personnel structure, wage structure, digitalisation, as well as adjustments and decisions of establishments in times of crisis. Similarly, the adapted questionnaire used in the first wave of the SOEP-LEE2-Self-employed ("Self-employed Module" in Figure 1) consists of 64 questions, with sizeable overlaps to the questionnaire of the two other surveys (Table 1).

Table 1: SOEP-LEE2 questions in wave 1 by theme.

Topic	Question number(s) SOEP-LEE2-Core and SOEP-LEE2-Compare	Question number(s) SOEP-LEE-Self-employed
Organizational characteristics		
Type	Q1	–
Ownership	Q2–Q4	Q4–Q5
Business formation	–	Q1–Q3
Sector	Q52	–
Legal form	Q53	Q52
Financial performance	Q54	Q53–Q54
Turnover	Q55	Q55–Q56
Staff costs	Q56–Q58	Q58–Q59
Other costs	–	Q57
Compliance and guidelines	Q6	–
Personnel structure		

Table 1: (continued)

Topic	Question number(s) SOEP-LEE2-Core and SOEP-LEE2-Compare	Question number(s) SOEP-LEE-Self-employed
Employment structure	Q7–Q11	Q7–Q15
Challenges for HRM	Q12, Q25	–
Human resource management/HRM		
Human resource department	Q13–Q17	–
Tasks of HRM	Q18–Q23	Q23, Q24, Q27–Q29
Decision processes	–	Q25, Q26
Working time	Q24	–
Investment and innovation		
Expenses	–	Q16–Q17
Innovation	–	Q18–Q22
Industrial relations		
Collective agreements	Q26–Q27	–
Worker participation	Q28–Q31	–
Remuneration		
Wages	Q32	Q30
Performance criteria	Q33	Q31
Other benefits	Q34–Q35	Q32, Q33
Digitalization		
Forms of digitalisation	Q36-Q38	Q35–Q37
Assessment of digitalisation and cybersecurity	Q39	Q38
Corona pandemic		
Effects of COVID-19	Q40	Q39, Q40
Personnel development	Q41	–
HRM adaptation from COVID-19	Q42–Q43, Q51, Q59	Q41
Remote work	Q44–Q50	Q42–Q49
Others		
Challenges	–	Q62
Interview information	Q60–Q64	–

The questionnaire used in the first wave of the SOEP-LEE2 data structure for employers was developed in a manner to allow for a wide set of questions that are comparable with those found in other business surveys such as CRANET (e.g. Christensen et al. 2019), IAB Establishment Panel (e.g. Ellguth et al. 2014), and the European Company Survey (e.g. Eurofound and Cedefop 2020). While questions may have been adapted, the essential content can, to a large extent, be found in other business surveys. Additionally, the questionnaires used in the first wave of the SOEP-LEE2 are, to some extent, comparable with that of the initial SOEP-LEE1 undertaken in 2012 using a similar employee first sampling approach based on SOEP-Core.

The structure of the SOEP-LEE2-Core survey is that of linking different themes in the questionnaire of the SOEP-Core survey to persons in dependent work with the themes in the questionnaire to employers in SOEP-LEE2-Core. We emphasize that it is employers broadly conceived, hereunder private firm as well as public employers covered by the SOEP-LEE2-Core (and SOEP-LEE2-Compare). The themes that can be matched in the first wave of the SOEP-LEE2-Core to SOEP-Core are shown in Figure 3.

The SOEP-LEE2-Core survey ("SOEP-LEE – Employer" in Figure 3) matched to the SOEP-Core survey ("SOEP-LEE – Employee" in Figure 3) is accordingly ideal to address research questions, which deal with the interplay between individual and structural establishment attributes. The individual data can be matched with related information from the employer, as shown in Figure 3.

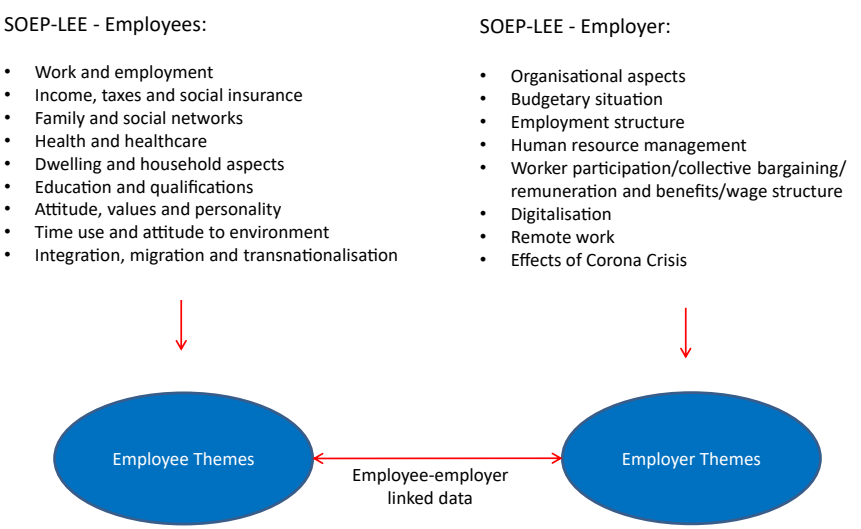

Figure 3: Themes being matched in the SOEP-LEE2-Core survey to those in the SOEP-Core survey. Source: Figure by authors. Figure pertains to questionnaires of the first wave of SOEP-LEE2-Core.

4 The SOEP-LEE2-Core Data as a Representative Sample of German Employees and Establishments

Participation in SOEP-LEE2-Core is voluntary, raising the issue of selection. To enable a first assessment, here we compare the first wave of the linked employees and employers in SOEP-LEE2-Core to the respective populations in Germany. Population statistics are drawn from administrative data of the Federal Employment Agency (FEA), which comprise all employees subject to compulsory social insurance (in German: sozialversiche rungspflichtig Beschäftigte (SVP)) and establishments with at least one SVP. Because establishments with fewer than five employees are not sampled in SOEP-LEE2-Core, we exclude these establishments from the FEA data as well.[1] At the establishment-level, the sample used in this section to compare with FEA consists of 696 establishments, 694 of these have valid information on total number of employed, all 696 could be allocated to a federal state, and 632 could be assigned to a business sector. Non-response on the question concerning business sectors does accordingly reduce the number of observations.

Results are presented in Table 2. The table's first four columns show data at the employee-level, i.e. number of employed covered by the two data sources. The indicator shown is the proportion of employees grouped by categories of the establishment size, federal states, and business sectors. For all three dimensions, employees in the SOEP-LEE2-Core data appear in proportions similar to those of the FEA data.

However, there are three exceptions. First, employees from larger establishments with 500 or more employees are underrepresented in SOEP-LEE2-Core, whereas employees in establishments with 10–49 employees are overrepresented in comparison with the FEA data. Second, employees working in public administration, the health sector, or the education sector are overrepresented compared to the FEA data. There is also relatively more employment in the FEA data in some of the business services and in manufacturing of capital and durable goods. Lastly, at the employment level, it is noticeable that the distribution across federal states only sees moderate differences.

These differences should be accounted for when interpreting the results from research based on SOEP-LEE2-Core. Overall, however, the percentages in the

1 The establishment size used for sampling derives from SOEP-Core respondents. In some cases, respondents reported a different size than the establishments themselves. In the analysis of Section 4, we rely on the size provided by establishments, as we consider it to be more accurate. Accordingly, establishments that reported to employ less than five persons are dropped from the analysis of Section 4. Moreover, we replace missing values in the size variable with information reported by SOEP-Core respondents.

Table 2: SOEP-LEE2-Core sample characteristics compared with FEA population characteristics.

	Employee level				Establishment level			
	SOEP-LEE2		FEA	Difference	SOEP-LEE2		FEA	Difference
	N	%	%	Percentage points	*N*	%	%	Percentage points
Establishment size								
5–9	71	9.5	8.1	1.4	67	9.7	43.4	−33.7
10–49	234	31.4	25.6	5.8	219	31.6	44.2	−12.6
50–249	239	32	30	2	227	32.7	10.5	22.2
250–499	81	10.9	11.6	−0.7	74	10.7	1.2	9.5
≥500	121	16.2	24.7	−8.5	107	15.4	0.7	14.7
Total	746	100	100	18.4	694	100	100	92.7
Mean (absolute difference)				3.7				18.5
Federal state								
Schleswig-Holstein	33	4.4	3	1.4	32	4.6	3.6	1
Hamburg	23	3.1	3	0.1	21	3	2.6	0.4
Lower Saxony	68	9.1	9.1	0	63	9.1	9.6	−0.5
Bremen	13	1.7	1	0.7	12	1.7	0.8	0.9
North Rhine-Westphalia	133	17.8	21.1	−3.3	128	18.4	20.2	−1.8
Hesse	63	8.4	7.9	0.5	58	8.3	7.5	0.8
Rhineland-Palatinate	30	4	4.3	−0.3	28	4	4.7	−0.7
Baden-Wuerttemberg	101	13.5	14.2	−0.7	96	13.8	13.3	0.5
Bavaria	128	17.1	17	0.1	119	17.1	17	0.1
Saarland	4	0.5	1.1	−0.6	4	0.6	1.1	−0.5
Berlin	39	5.2	4.7	0.5	34	4.9	4.2	0.7
Brandenburg	33	4.4	2.5	1.9	31	4.5	3	1.5
Mecklenburg-Vorpommern	16	2.1	1.7	0.4	15	2.2	2.2	0
Saxony	49	6.6	4.8	1.8	48	6.9	5.1	1.8
Saxony-Anhalt	34	4.5	2.3	2.2	26	3.7	2.6	1.1
Thuringia	29	3.9	2.3	1.6	28	4	2.6	1.4
Total	748	100	100	16.1	696	100	100	13.7
Mean (absolute difference)				1				0.9
Business sectors								
Agriculture, forestry, and fishing	3	0.4	0.6	−0.2	3	0.5	1.3	−0.8
Mining and quarrying, energy supply, waste management	17	2.5	1.8	0.7	16	2.5	1.2	1.3
Manufacture of food products and nondurable goods	23	3.4	3.7	−0.3	19	3	2.8	0.2
Manufacture of capital and durable goods	83	12.2	17.5	−5.3	75	11.9	8.3	3.6
Construction	27	4	5.4	−1.4	25	4	11.3	−7.3

Table 2: (continued)

	Employee level				Establishment level			
	SOEP-LEE2		FEA	Difference	SOEP-LEE2		FEA	Difference
	N	%	%	Percentage points	*N*	%	%	Percentage points
Retail trade and repair of motor vehicles and motorcycles, wholesale	26	3.8	6.1	−2.3	25	4	7.9	−3.9
Retail trade	47	6.9	7	−0.1	43	6.8	11.8	−5
Transportation and storage	20	2.9	5.8	−2.9	19	3	4.8	−1.8
Accommodation and food service activities	11	1.6	2.5	−0.9	10	1.6	5.6	−4
Information, financial, and insurance activities, real estate activities, professional, scientific and technical activities, administrative and support service activities	100	14.7	20.8	−6.1	93	14.7	20.7	−6
Public administration, education, human health and social work activities	325	47.7	26	21.7	305	48.3	19.6	28.7
Other service activities	39	5.7	2.9	2.8	37	5.9	4.7	1.2
Total	682	100	100	44.7	632	100	100	63.8
Mean (absolute difference)				3.7				5.3

SOEP-LEE2-Core sample are often closely aligned with the FEA data, supporting a reasonable validity of the SOEP-LEE2-Core data in spite of sampling among employees in an employee first approach.

5 Conclusions

The SOEP-LEE2 data offers various new opportunities for research on the German labor market, the interrelationships between employers and employees, the self-employed, and also on methodological issues.

First, the SOEP-LEE2 data offer a distinctive opportunity to gain insights about the German labor market in the years 2022–2024, with a possible extension through 2026. This covers a period of large societal challenges including the COVID-19 pandemic, war in the Ukraine, an energy crises that was followed by high inflation with manifold implications for employees and employers.

Second, the SOEP-LEE2 data allows analyses about the implications of digitalisation and human resource management practices for working life and firm performance.

Third, the data allow for research into the methodological issues of using an employer first approach, having similar survey data for employers in an employer first context, i.e. the SOEP-LEE2-Core survey, and for a representative sample of employers, i.e. the SOEP-LEE2-Compare survey over a period of at least 3 years. This is, to the best of our knowledge, a unique feature of the SOEP-LEE2 data structure, which merits more methodologically oriented research on survey design choices for such linked data. Non-response analysis can be used to gain deeper insights into the structure of samples, thus enabling effective quality management. Such non-response analysis will take place in cooperation with the IAB, among others. In addition, the SOEP-LEE2-Compare of the SOEP-LEE2 data structure gives researchers a pathway to investigate the changes in choices made among a representative cross-section of employers in their practices and prioritizations in Germany.

Fourth, the SOEP-LEE2 data allow for cross-data and -country research. This is because of its high degree of comparability in terms of questionnaire design. While not all international surveys comprise all thematic fields contained in the questionnaire of the SOEP-LEE2 data structure, the questions of the first wave are, to a high degree, comparable with questions used in other renowned establishment surveys in Germany and internationally. The SOEP-LEE2 data structure accordingly comprise a Comparability Codebook, which links a wide set of questions of the SOEP-LEE2 "General Employer Module" of Figure 1 to similar questions used in other business surveys.

6 Data Access and Documentation

The different elements of the SOEP-LEE2 data structure laid out in Figure 1 can be accessed through the SOEP-Core data distribution, starting with SOEP-Core Version 38 (SOEP-Core, v38, Onsite Edition). Due to privacy reasons, access is planned to take place along two paths. One path is the access to a data structure, which contains a selected set of information in scientific use files. The access to the full data structure takes place through onsite usage in the SOEP Research Data Center, meaning that the full data structure can be used as a guest researcher at DIW Berlin.

The documentation of the surveys in the SOEP-LEE2 data structure can be found on https://paneldata.org. For each variable, the website's search results provide the survey question and additional useful meta information.

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