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Methodological aspects of labour market data

The German Management and Organizational Practices (GMOP) Survey

Survey Design and Data Quality

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Abstract

The German Management and Organizational Practices (GMOP) is the first large-scale survey that systematically investigates the use of management practices in German establishments. The data includes information on over 1,900 establishments for the years 2008 and 2013 and allows detailed analyses on the relationship between management practices and firm performance. Linked with administrative individual and establishment data, the GMOP can be used by external researchers.

Providing an overview of the survey and data quality, this paper is a point of reference for analyses based on the GMOP. We describe the questionnaire design and important steps of the field phase. Further, data quality issues with a special focus on sample selection, response rates and representativeness are discussed. As informed consent to linkage is legally required in Germany, we additionally analyze which respondents are most likely to consent.

Zusammenfassung

Die Befragung "German Management and Organizational Practices" (GMOP) ist die erste großangelegte Studie in Deutschland, die sich systematisch mit dem Einsatz von Managementpraktiken in deutschen Betrieben beschäftigt. Der GMOP Datensatz enthält Informationen von mehr als 1.900 Betrieben für die Jahre 2008 und 2013 und ermöglicht Analysen zum Zusammenhang zwischen Managementpraktiken und wirtschaftlichen Erfolg von Betrieben. GMOP kann von externen Datennutzerinnen und Datennutzern sowohl einzeln als auch kombiniert mit administrativen Beschäftigten- und Betriebsdaten genutzt werden.

Dieser Methodenreport gibt einen Überblick über die Befragung und die Qualität der Daten. Neben der Fragebogenentwicklung werden wichtige Schritte der Feldphase, Stichprobenziehung, Rücklaufquoten sowie die Repräsentativität der Daten beleuchtet. Zudem wird der Zusammenhang zwischen Alter, Geschlecht und Position der antwortenden Person und der Zuverlässigkeit untersucht.

Keywords: establishment survey, survey design, consent to linkage, linkage to administrative data, personnel economics

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1 Introduction

This paper presents a novel dataset, called the „German Management and Organizational Practices” (GMOP) survey. With over 1,900 completed interviews, GMOP is the first systematic and large scale survey in Germany that directly aims at the investigation of management practices and their impact on establishment performance. The survey was carried out jointly by the Kiel Institute for the World Economy (IfW), the Institute for Employment Research (IAB) and the Institute for Applied Social Sciences (infas). Project financing was provided by the Leibniz Association.

The GMOP survey design as well as the questionnaire are based on the “Management and Organizational Practices Survey” (MOPS), which was carried out in the US in 2010 by the US Census Bureau and introduced by Bloom et al. (2013). Following Nick Bloom and John van Reenen’s suggestions, we transferred 16 questions on management practices referring to monitoring, targets and incentives from MOPS and supplemented the German survey with, amongst others, questions on health practices and work-life balance measures.

The survey was carried out in 2014/2015 and collects information relating to the years 2008 and 2013. The data is specifically suited to analyses of management and human resources (HR) practices and their association with different establishment performance measures such as labor productivity, exports or innovations. The management practices can be investigated individually for their magnitude or in combined indices following Bloom et al. (2013). In addition, it is possible to link the survey data to administrative data available at the IAB, which offers various further analysis potential. Examples include the relationship between management practices and wage differentials or employment development.

External researchers can obtain access to the GMOP data via on-site use at the Research Data Center (Forschungsdatenzentrum, FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg and its outposts. In addition to the survey data (GMOP), the linked data (GMOP-ADIAB) data can also be requested. The GMOP-ADIAB includes administrative information on the establishments as well as on individuals who were employed in the surveyed establishments between 2007 and 2014 in addition to the survey data.

With this paper, we aim at providing an overview of the survey and the data quality. We outline the questionnaire in section two and describe the population, sampling design and the target respondents in the following sections. Section five outlines the field phase and discusses response rates. Section six focuses on representativeness and data quality issues. Before concluding in section eight, section seven discusses linkage possibilities.

2 The GMOP Questionnaire

Building on research done by Nick Bloom and John van Reenen, we transferred the US MOPS¹ into the German context for the most parts. All questions are based on recall and most of them relate to the reference years 2008 and 2013, so that a two-wave panel can be constructed. Single items that pertain to the background of the establishment like ownership structures or tariff agreements were only asked for in 2013 since no major changes were expected.

During the questionnaire creation, two trade-offs arose. First, in order to make cross-country comparisons possible, we had to ensure comparability between the questions asked in Germany and those asked in the US. At the same time, some questions had to be adapted to fit the German legislation and labor market restrictions. For example, questions on hiring and firing practices had to be modified in accordance with German labor protection laws. Second, a trade-off between survey length and information density had to be dealt with. Unlike in the US, the merging of survey data to other data sources is only allowed in Germany if the establishment expresses its explicit content to linkage. Anticipating that not all establishments would agree, we extended the questionnaire to include background information, as well as information on productivity and performance. Thus, the German questionnaire includes additional questions regarding, for example, sales, exports and innovations.

Nevertheless, we retained the structure of the US questionnaire when possible and translate the questions in the spirit of their original meaning. The designed questionnaire consists of five parts and starts with questions on management practices, which are closely based on the 16 standard US MOPS topics, namely: monitoring (e.g., collection and review of performance indicators), targets (e.g., in-house communication and timeframe of targets) and incentives (e.g., performance bonuses and promotions). Some questions were adapted to fit the German context, for example those on lay-off practices: Both the German and the US questionnaire analogously question when underperforming non-managers or managers are reassigned or dismissed. The answering categories are “Within 6 month of identifying under-performance”, “After 6 month of identifying under-performance” and “(Rarely or) never”. In the US, “right to work” states allow the termination of a work contract within a very short period of notification, while extensive labor protection laws are in place in Germany. However, within the first six month after recruitment, employees generally are in a statutory probationary period, which serves the purpose of testing the suitability of new employees. During this period the employment relationship can be terminated easily from both sides as employees are not yet protected by the law; therefore we excluded persons that are in their probationary period from the question.

Due to suggestions of Nick Bloom and John van Reenen, the original Section B “Organization” from the MOPS questionnaire was not retained in the German version. Instead, some new

¹ The US MOPS is based on the World Management Survey (WMS) and includes information on over 30,000 manufacturing firms in the US. For a detailed overview of the survey see Bloom et al. (2013). The questionnaire can be downloaded here: <http://www.managementinamerica.com>.

topics were included. A battery of items refers to the use of health practices and work-life balance measures, which can be interpreted as more modern management practices, compared to the original 16 items from the MOPS. Further, we asked about measures promoted by the Federal Employment Agency, which pertain to measures developed to support establishments in times of crisis (e.g., short-time work), or to measures designed to aid specific employee groups, such as older employees or individuals who have problems of being integrated into the labor force.

Additionally, rating questions on the importance of monetary and non-monetary incentives, as well as on the overall management quality in the establishment were included.

Questions pertaining to background information on the establishments, such as the ownership structure and the number of managers and non-managers, as well as performance indicators such as revenue, exports, innovations and engagement abroad are inquired about in the second and third part of the questionnaire.

Again deviating from the US questionnaire, additional questions about the composition of the board of directors in terms of gender, nationality and international experience were developed (part four).

The questionnaire ends in part five with questions on personal characteristics of the respondent analogous to the MOPS. They refer to the gender, tenure and position of the respondent in the establishment and can be used as control variables in multivariate estimations.²

The full GMOP questionnaire is available on the FDZ homepage.³

3 Population and sample selection

The sample was drawn from the Employment History Panel (BHP), which includes all establishments in Germany with at least one employee liable to social security (Gruhl et al., 2012). The reference year was 2011. We restrict the study population to establishments with 25 or more employees liable to social security, because structured management practices are generally not required in smaller establishments. Further, analogously to the US, we only look at establishments in the manufacturing industry. However, due to a limited number of existing establishments, we expand the sample with establishments from the construction industry.⁴

² In the US research these variables are summarized under the term “noise controls”. As a further para-data variable the answering method (paper-pencil or online) can be included as control variable.

³ See also Broszeit and Laible (2016).

⁴ The MOPS questions on management practices were designed to fit manufacturing industries (e.g. “What happened at this establishment when a problem in the production process arose?”). The inclusion of other industries (except the construction sector, which is very similar) like e.g. the service sector, would not have been suitable. In addition, one aim of the survey was the comparability of the German with the US data.

Applying these industry and size restrictions, the target population consists of 54,619 establishments.

For the purpose of merging the collected survey data to additional company-level information, we enhanced the sample with data from Bureau van Dijk (BvD). BvD is a commercial provider of financial company data including, among others, sales, operating revenue and capital. The establishments in the administrative data (BHP) were matched with companies from BvD through record linkage procedures (Schild, 2016; Antoni et al., 2017). In this process, not all establishments from the BHP were assigned to BvD firms, but since the underlying assumption is that the matches are randomly linked, the resulting sample is considered to be a random selection of establishments. For the final sample we only considered establishments with a valid IAB-BvD-link, which applied to around 85 percent of the 54,619 establishments. If more than one establishment was assigned to one company, one establishment was chosen randomly. Further, we dropped establishments that were no longer active in 2014 as well as those that we already included in a pretest sample. Finally, in order to constitute a sample with an adequate number of establishments in different sub-industries, establishment sizes and settlement structures, a disproportional stratified random gross sample of 32,847 establishments was selected. For more information on the sample selection see Broszeit and Laible (2016).

The strata variable “establishment size” consists of three size classes, i.e. 25-49 employees, 50-99 employees and 100 or more employees. “Industry” includes five sub-industry classifications according to WZ2008⁵, i.e. food and consumption (C1-C13), consumer products (C14-C18), industrial goods (C19-C24), investment and durable goods (C25-C33) and construction (F41-F43). Lastly, “settlement” consists of four settlement structures according to the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR, 2015), i.e. larger cities, urban regions, rural regions with signs of densification and sparsely populated rural regions. In deviation from the US sample design, we chose to survey a larger number of small- and medium-sized establishments, the so-called “Mittelstand” in Germany, as these make up the majority of German establishments.

4 Target respondents

The chosen target respondents are top managers, i.e. managing directors, CEOs, division or plant managers. This choice was made for several reasons: First, while the survey is tailored to establishments, it is an individual who ultimately responds on behalf of the business. Therefore, an individual with the authority and the capacity to answer was required. As managers are already assigned the role of establishment representatives, they are the most likely to also assume this role in the survey. A manager often has to authorize the participation in surveys and sign off the questionnaire at the end, thus directly surveying managers may lead to skipping potential intermediary steps or persons. Additionally, a manager has the capacity to answer meaning that he/she has knowledge of the relevant management practices, as well as

⁵ German Classification of Economic Activities, 2008 edition (Destatis, 2015).

access to required data. Lastly, a manager should have a certain competency concerning management practices, thereby increasing data quality. Thus, the response burden should be smaller for a manager compared to another respondent, as answering questions in his field of expertise should be rather easy. We believe them to have the best overview of the establishment's processes and structures. Consequently managers can give reliable information both on the use of management practices and performance measures (Tomaskovic-Devey et al., 1995).

Despite the advantages, choosing a manager as a target person also leads to possible disadvantages. Managers are hard to access, as the survey often has to bypass gatekeepers, such as secretaries. Once the survey has reached the manager, this respondent is also the one with more competing activities for whom the time burden of completing the survey may be too high. Finally, it is plausible, that the respondents are a positive selection, as only managers knowing that they have good management practices answer the survey. In order to make up for these disadvantages and to mitigate low response rates, we extended the last reminders to also include the HR departments.

5 Field phase

5.1 Survey instrument and field organization

The study was carried out by infas, a company experienced in running large-scale surveys. We decided to keep the original MOPS survey format by conducting all interviews as mixed mode with a simultaneous approach either by paper-pencil (PAPI) or online (CAWI) with the choice of mode given to the respondents.

Prior to sending out the questionnaires, refinement calls were made. Thereby, infas called all establishments up to 50 employees in the spring and summer of 2014 in order to find out the name and email address of the target person in the establishment. A pretest revealed that it is only valuable to telephonically screen small establishments up to 50 employees. According to these pretest results, a split strategy was used for the main field phase in which smaller establishments up to 50 employees received refinement calls, while larger establishments did not. For more information see Schröder und Weiß (2016).

The pretest further revealed a need to increase the willingness to participate, as response rates were rather low. Therefore, an incentive consisting of a report of the main results sent exclusively to participants, was offered to the establishments. The reward was given under the assumption that managers would be interested to benchmark their performance in comparison to other establishments. However, only 42 percent of the respondents consented to receiving results.

5.2 Field phase and characteristics of the participating establishments

The field phase lasted from November 2014 to May 2015. 1,927 complete interviews were collected. 71 percent of the respondents chose to answer the questionnaire by PAPI and the remaining 29 percent preferred to answer online (CAWI). The expected time needed for the completion of the PAPI was 20 to 30 minutes, however the average response time for CAWI interviews was 18 minutes.

Over 90 percent of all completed questionnaires were answered by the preferred target group: 65 percent of the respondents were CEOs or executive officers, 4 percent were a manager of multiple establishments, 10 percent were a manager of one establishment and 11 percent were a manager within an establishment. The 3 percent of respondents that indicated that they have no responsibility for managing employees were most likely employees in HR departments. The remaining 6 percent did not answer the question or marked the category "other". The responding persons have an average tenure of 17 years and about 80 percent are male.

Table 1 gives an overview of the survey summary statistics. The establishments had 144 employees in 2008 and 160 in 2013 on average. 20 percent have an executive board and over two thirds export. 14 percent of the participating establishments are foreign-owned, 60 percent are family-owned and 43 percent have a works council.

Table 1: Summary statistics of the full data

Variable	2008			2013		
	N	Mean	SD	N	Mean	SD
Employees	1,634	144.36	356.70	1,812	159.68	389.50
Managers	1,707	11.67	25.02	1,867	13.33	26.91
Non-Managers	1,684	134.65	338.24	1,828	147.40	372.50
Executive board (D)	1,816	0.20	0.40	1,887	0.20	0.40
FDI (D)	1,813	0.20	0.40	1,893	0.23	0.42
Exports (D)	1,819	0.67	0.47	1,898	0.69	0.46
Offshoring (D)	1,517	0.13	0.34	1,598	0.16	0.36
Innovations (D)	1,560	0.71	0.45	1,759	0.79	0.41
Foreign Ownership (D)	-	-	-	1,921	0.14	0.34
Family Ownership (D)	-	-	-	1,882	0.60	0.49
Collective agreement (D)	-	-	-	1,890	0.40	0.49
Works council (D)	-	-	-	1,880	0.43	0.50
Independent company (D)	-	-	-	1,911	0.79	0.41

Notes: Not weighted. D indicates a dummy variable.

Source: Own calculations based on GMOP.

5.3 Response rates

The total number of 1,927 interviews amounts to a response rate of 5.9 percent. Table 2 provides information on the achieved response rates by the stratification variables. Comparing the

response rates within the stratification variables shows that the participating establishments are spread over all categories and that there are only small outages in single matrix cells. It appears that with a response rate of 4.6 percent, small establishments with 25 to 49 employees are slightly underrepresented, whereas medium and large establishments are overrepresented. Their probability to take part is 6.5 percent, compared to 7.2 percent for larger establishments. This result is in line with evidence from the literature which predicts that establishments with 20 to 49 employees have the highest response burden (Snijkers et al., 2013). Small businesses benefit from short communication lines and large establishments in contrast usually have good documentation systems, both of which lower the burden for these size classes compared to the medium size class.

For the industrial sectors the deviations are smaller. Establishments from the “Industrial goods” sector are somewhat overrepresented, while establishments from the constructing sector took part below average. In terms of the settlement structure, there are hardly any differences.

Table 2: Response rates by stratification variables

	Number of establishments in the gross sample	Number of participating establishments	Response rate (%)
<i>Size</i>			
25-49 employees	15,875	739	4.6
50-99 employees	8,825	588	6.5
100 and more employees	8,147	600	7.2
<i>Industry</i>			
Food and consumption	3,509	197	5.5
Consumer products	2,766	190	6.8
Industrial goods	5,201	381	7.1
Investment and durable goods	13,916	863	6.0
Construction	7,455	296	3.9
<i>Settlement</i>			
Larger cities	6,057	364	5.9
Urban regions	14,135	784	5.4
Rural regions with signs of densification	7,085	425	5.9
Sparsely populated rural regions	5,570	354	6.2
Total	32,847	1,927	5.9

Source: Own calculations based on GMOP and BHP.

Regarding the relatively low response rates we consider three possible explanations. First, the questionnaires have to bypass gatekeepers such as secretaries or personal assistants, so it is essential to dispatch the survey to the right person at the right moment (Snijkers et al., 2013). Phone screenings and emails received by refusing respondents revealed that many gatekeepers have “no-answer” rules, time constrictions or are concerned about data protection and therefore do not want to participate in the survey. Second, the content of the survey may not have appealed to all addressed establishments. Starting with a question on problems in the

production process, the questionnaire might not seem relevant for certain establishments, in particular those without production facilities such as a sales or R&D branch or those in the construction sector. Third, practitioners' observations at the IAB showed that establishments are over-surveyed. Despite efforts of comprehensive sample drawings designs, especially large establishments are frequently part of sample drawings due to their scarcity in Germany. These establishments may have grown tired of responding to surveys.

6 Representativeness and data quality

6.1 Representativeness

Due to the low response rate, it is proper to check whether the sample is representative of the target population. Since detailed administrative data is available for the entire population, we can compare the participating establishments with all establishments in the target population. The results, which are based on the BHP 2011, are shown in Table 3. Columns (1) and (2) indicate whether responding establishments differ significantly from the total sample population along particular establishment characteristics.⁶ Column (3) depicts the differences.

We only observe very small deviations. Participating establishments have a slightly better qualification structure. 86.5 percent of all employees in the GMOP establishments have at least a lower secondary, intermediate secondary or upper secondary school leaving certificate and a vocational qualification, or a degree from a university. In the whole population, this factor stands at 85.9 percent. This difference is statistically significant, but very small in size. No significant differences can be found regarding the share of females, the share of trainees, the age of employees or the establishment age.

Column (4) illustrates the means of the participating establishments by using sampling weights. These were provided by infas and correct for the disproportional stratified sample drawing.⁷ The means quite accurately align to the means of the total population, which indicates that the differences are not severe and that the deviations can be accounted for by using weights. Additionally, the differences in column (3) are very small. Although there is statistical significance in some cases, most values are below 1 percentage point. We thus consider the data to be representative.

⁶ No survey information was used, only an indicator on whether the establishment took part or not. Therefore, the linkage consent agreement is not violated.

⁷ Therefore deviations in the stratification variables are not a concern. They naturally originate from the drawing procedure and are compensated by the weights.

Table 3: Comparison of means

	(1) Total population	(2) GMOP Respondents	(3) Difference (2)-(1)	(4) GMOP respondents (weighted)
Number of employees (ln)	4.2 (0.9)	4.3 (0.8)	0.1 ***	4.1 (0.8)
Female employees (share)	26.5 (21.0)	27.0 (19.0)	0.6	26.6 (19.6)
Qualified employees (share)	85.9 (11.3)	86.5 (10.4)	0.6 **	86.4 (10.6)
Trainees/apprentices (share)	4.8 (5.7)	4.7 (5.1)	0.0	4.9 (5.5)
Mean age of employees	42.1 (4.1)	42.2 (3.8)	0.1	42.1 (3.9)
Median wage of employees	90.5 (30.4)	90.7 (27.7)	0.2	89.6 (27.2)
Age of establishment	23.8 (12.0)	23.9 (11.9)	0.4	23.6 (12.1)
<i>Employment development</i>				
No change in employment	8.1 (27.3)	6.6 (24.8)	-1.5 **	7.3 (26.1)
Increase in employment	58.6 (49.3)	60.2 (49.0)	1.6	59.5 (49.1)
Decrease in employment	33.2 (47.1)	33.2 (47.1)	0.0	33.1 (47.1)
Observations	~50,800	~1,880		~1,880

Notes: Standard deviation in parentheses. Number of observations may vary with variables due to missing observations. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on GMOP and BHP 2011.

6.2 Recall bias

Since most questions in the questionnaire retrospectively refer to the years 2008 and 2013, memory error might be a source of bias in the data. To test for potential recall bias, we compare process-generated data from the IAB and the GMOP survey data, where possible. The correlation for the number of employees, as well as for the share of high-qualified employees, is 0.74 in 2008 and 0.77 in 2013. Both correlations are statistically significant at the 1 percent level. Thus, we see no large increase in differences indicating that the recall bias keeps within limits.

Regarding the questions on management practices, we assume that practices usually are adopted within the scope of organized restructuring processes or as part of personnel management decisions. As these generally are well documented, we reason that the respondents checked their information, if they were in doubt. Even if the respondents were unable to check information on the introduction of management practices, there is evidence in the literature that the extent of report error on annual amounts is relatively small and that errors occur more frequently in the exact timing of events within the year (Mathiowetz and Duncan, 1988).⁸ The length of the recall period is a relatively unimportant determinant of recall bias. Furthermore, Tourangeau (2000) explains that people generally remember events quite well (in our case, say a change in the remuneration system) and then can associate related details (e.g. a

⁸ This study refers to unemployment spells, however the transference can be made to the establishment-level.

change in the determinants for performance bonuses). However, if certain issues cannot be remembered, people tend to estimate based on general assumptions about similar events, a type of memory error (Tourangeau, 2000). Overall, we assume that a recall of the existence of structured management practices can be expected.

A further possible problem is that the respondent had not been employed in the establishment in 2008 or 2013. However, we can mitigate this concern by looking at the average years of tenure of our respondents, which is 17 years and therefore well within the scope of the questionnaire.

One last concern relating to retrospective questions is the tendency to report in a way that makes establishments and managers look good, i.e. to avoid reporting that management practices became worse from 2008 to 2013. Especially, when respondents themselves were responsible for the abolishment of practices or, when the questionnaire was double checked by a superior higher up in the hierarchy, respondents might have stated management practices in 2013 to be better than they actually were. Figure 1 provides the change in the management score⁹ between 2008 and 2013. As we do see deterioration happening in some establishments, we believe that most respondents replied accurately.

Figure 1: Changes in the management score between 2008 and 2013



Notes: Weighted observations. 5 percent random noise added for data protection reasons. Only observations with valid values for 2008 and 2013. Number of observations: 1,576. For the calculation of the management score see Broszeit et al. (2016).

Source: Own presentation.

⁹ For the calculation of the management score, the 16 items on management practices were normalized on a 0 to 1 scale and then summarized by an unweighted average. For more details, see Broszeit et al. (2016).

To conclude, we are aware of possible issues related to recall bias. Over a period of up to eight years in the past, people make mistakes, whether willful or not. However, taking the above mentioned deliberations into account, we believe to have obtained rather reliable answers to our questionnaire. Unfortunately, we cannot test for potential errors mathematically, and we advise researchers to consider potential biases when working with the GMOP data.

6.3 Unit non-response

Lastly, unit non-response is investigated. We use data from the BHP 2014, since the field phase started at the end of this year, and conduct a multivariate selectivity analysis, which shows if certain variables significantly influence the willingness to take part in the survey. Following Janik and Kohaut (2012), who argue that potential influential variables for the participation in establishment surveys are firm size, legal form, whether the establishment is an independent company as well as the economic situation of the establishment, we look at these variables when the information is available.

Table 4 shows the marginal effects of probit regressions with the dependent variable taking the value one if the establishment gave a valid survey interview and zero if it did not. Column (1) includes the establishment characteristics as well as the stratification variables. In column (2) we use a 2-digit industry classification as well as the exact number of employees for 2014 instead of the strata. They are more detailed and closer to the time of the field phase. Additionally, dummies for the German federal states are included.

Table 4: Unit non-response

Dependent variable: GMOP respondent (D)	(1)		(2)	
Female employees (share)	0.00	(0.00)	-0.00	(0.01)
Qualified employees (share)	0.03	(0.01) ***	0.02	(0.01) *
Trainees/apprentices (share)	0.08	(0.02) ***	0.08	(0.02) ***
Mean age of employees	0.00	(0.00)	0.00	(0.00)
Median wage of employees	-0.00	(0.00) ***	-0.00	(0.00)
Age of establishment	-0.00	(0.00)	0.00	(0.00)
<i>Employment development (ref: no change)</i>				
Increase in employment	0.00	(0.00)	0.01	(0.00) *
Decrease in employment	0.00	(0.00)	0.00	(0.00)
<i>Size (ref: 25-49 employees)</i>				
50-99 employees	0.01	(0.00) ***	-	
100 and more employees	0.02	(0.00) ***	-	
<i>Industry (ref: Food and consumption)</i>				
Consumer products	0.02	(0.00) ***	-	
Industrial goods	0.02	(0.00) ***	-	
Investment and durable goods	0.01	(0.00) ***	-	
Construction	-0.00	(0.00)	-	
<i>Settlement (ref: Larger cities)</i>				
Urban regions	-0.01	(0.00) **	-0.00	(0.00)
Rural regions with signs of densification	-0.00	(0.00)	-0.00	(0.00)
Sparsely populated rural regions	-0.00	(0.00)	-0.00	(0.00)
Number of employees (ln)	-		0.01	(0.00) ***
Industrial classification, 2 digits	No		Yes	***
Federal states	No		Yes	**
Observations	50,624		50,624	
Pseudo R-squared	0.013		0.016	

Notes: Probit estimations. Average marginal effects. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on GMOP and BHP 2014.

The estimates indicate that establishments with a higher share of trainees are more likely to take part in the survey. High shares of qualified workers as well as the median wage of all employees also have a significant positive effect, but these effects are close to zero and almost disappear when using the more detailed variables. Additionally, size and industry are significant, whether included as strata or not. However, many firm characteristics are not related to the likelihood of participating in the survey, such as the share of females, the mean age of all employees, the age of the establishment or the employment development. The latter could be a proxy for the economic situation of the firm.

The significance of some variables could indicate systematic bias and may harm the generalizability of results. But since all point estimates are very small, we do not see any serious concerns. Furthermore, the fit of the model, measured by pseudo R-squared, is very low, which supports this statement. Overall, the results suggest that systematic unit non-response does

not affect the estimation results via biases incurred by the lack of participation of some establishments.

7 Linking the GMOP to other data sources

7.1 Linkage possibilities

One special feature of the GMOP data lies in the linkage possibilities to other data sources available at the IAB. As the sample drawing design was based on administrative data with a valid IAB-BvD-link, the GMOP can easily be matched to both the process-generated data, as well as to financial data provided by BvD. Figure 2 provides an overview of linkable data sources.¹⁰ The merges are always made using a common establishment identifier, but are only eligible for those establishments which consented to linkage.

At the establishment-level, the GMOP can be linked with the BHP, which includes all German establishments with at least one employee subject to social security on the 30th of June of each year since 1975. The BHP contains extensive establishment information e.g. on the industry, the location, the number of employees in full- and part-time, qualification structures, gender and age structures, wages and worker flows (Schmucker et al., 2016). The GMOP-ADIAB involves yearly tranches from 2007 to 2014.

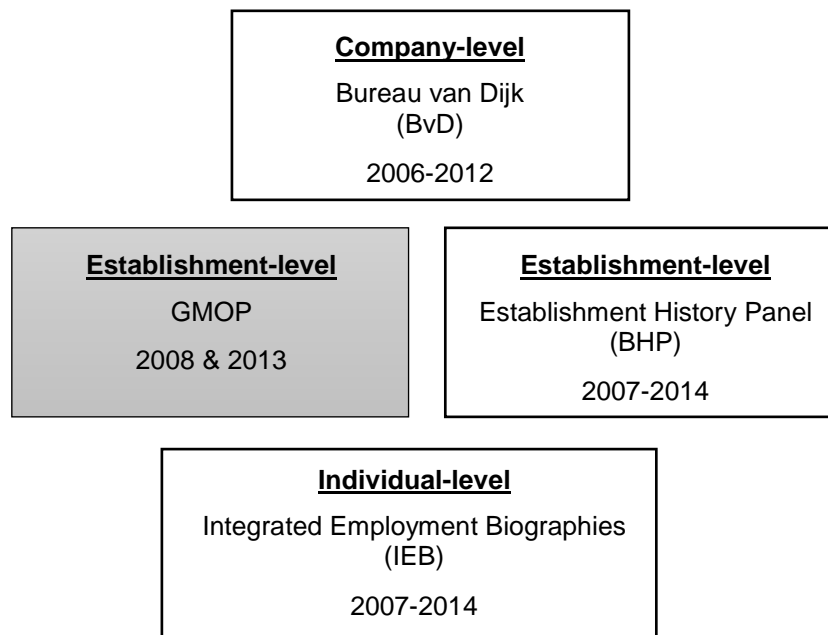
At the company-level, financial information from BvD can be merged, which includes, for instance, capital, operating revenue, material and labor costs. Regarding the BvD match, it must be noted that the information is measured at the company- instead of the establishment-level.¹¹

At the individual-level, the GMOP can be linked with the Integrated Employment Biographies (IEB). This data is based on administrative information provided for every employee subject to social security. The GMOP-ADIAB contains information on all individuals who worked at least one day in the establishment between 01.01.2007 and 31.12.2014. The variables chosen for the GMOP-ADIAB align with those found in the Sample of Integrated Labour Market Biographies (SIAB; Antoni et al., 2016), however, information coming from the Participants-In-Measures History File (MTH - Maßnahmeteilnahmehistorik) is not included. Besides gender, age, nationality, number of children, schooling and vocational training, the data provides information on tenure, unemployment periods, occupation as well as daily wages. Thus, the GMOP-ADIAB data can be used for analyses on wages, qualification differentials or turnover rates.

¹⁰ The linked data is provided to external researchers under the designation GMOP-ADIAB. Please refer to the FDZ homepage for information on the data access.

¹¹ In the near time external researchers will not be able to get access to the linked GMOP-BvD data.

Figure 2: Linkage possibilities



Source: Own presentation.

7.2 Assets and drawbacks of data linkage

Supplementing survey data with other (administrative) data has a number of benefits (e.g. Winkler, 1995; Sala et al., 2014; Künn, 2015). First, linked data allows for more detailed analyses since more information is available. For example, analyses on the employee- or company-level or in a longitudinal setting are possible. Additionally, administrative data usually is more accurate since measurement errors are scarce and data quality is controlled. The second advantage is related to parallelism of information. Adding single items to the questionnaire that are also available in the administrative data allows one to test the validity and reliability of the given information. For the GMOP-ADIAB, these are the number of employees and the qualification structure in the administrative data, which can then be compared with the number of managers and non-managers and the share of managers and non-managers with university degree in the survey data (see section 6.2). Third, bearing in mind that much useful information can be added through linkage, the survey questionnaire itself can be kept shorter and does not have to take up questions on background information. On the one hand, this reduces the time for completing the questionnaire and thus respondent burden. On the other hand, overall survey costs can be reduced and then invested in an increasing number of interviews. Lastly, the questionnaire can be designed more appealingly for potential participants as only topic-related questions must be inquired about.

Despite the advantages, linkage involves also some drawbacks (e.g. Künn, 2015). Since German law mandates an informed consent of the persons or establishments concerned for linking survey data to administrative data (Federal Data Protection Act, 2013, Part I, Section 4; Code of Social Law X, 2013, Section 75), the sample size is reduced. Table 5 shows that only 53

percent of all establishments in the GMOP survey consented to linkage. 31 percent did not agree and the remaining 16 percent were either not authorized or did not answer the question. Thus, in the GMOP-ADIAB the sample size is reduced by half.

Table 5: Consent to linkage

Consent to linkage	(1) Frequency	(2) Percentage
Yes	1,021	53
No	606	31
Not authorized	186	10
NA	114	6
Total	1,927	100

Notes: Question: "To complement the information collected, the Institute for Employment Research (IAB) would like to include data that is available at the IAB Nuremberg in the evaluation of this survey. These data include, for instance, information on the development of employment in the past. To link these data with the collected data, we would kindly ask you for your consent. This is required by the data protection act. The evaluation of this information strictly and absolutely complies with all data protection laws. Your agreement is voluntary. You can withdraw from your agreement at any time. Do you agree? Response options: Yes, I agree; No, I do not agree; I am not authorized; I do not know; Refuse. Due to data protection reasons the last two categories were consolidated.

Source: Own calculations based on GMOP.

Special establishment characteristics, such as firm size influence willingness to consent, could lead to biases in analyses with the linked data only. We test for this by calculating consent linkage bias in section 7.4. Further, inconsistencies may exist between survey and administrative data (Huber and Schmucker, 2009), such as for example on the number of employees. Lastly, the link itself might be wrongfully reflected by the fact that the participating establishment is not identical to the one registered in the administrative data. This also occurs if the unit varies, for example when the interview is given based on the company- instead of the establishment-level.

Overall, we believe that the advantages of linking data outweigh the disadvantages and thus we planned the survey with linkage possibilities in mind.

7.3 Who agrees to linkage?

Table 6 indicates which respondents consented to linkage. From all participating CEOs 61 percent gave their permission to link the data. In the other groups, this share is much smaller. Especially non-managers and persons that did not indicate their position show a low probability of consenting to linkage. Since high-level managers are most likely to have the authority and the capacity to answer (Snijkers et al., 2013) this descriptive result is in line with our expectations.

Table 6: Consent to linkage by job position

Respondent job title	(1)	(2)	
	All GMOP respondents	Frequency	Percentage
CEO	1,256	760	61
Manager of multiple establishments	84	34	40
Manager of one establishment	186	70	38
Manager within an establishment	220	95	43
Non-manager/Other/NA	181	62	34
Total	1,927	1,021	

Source: Own calculations based on GMOP.

To see whether the probability of consenting to linkage is additionally driven by the gender and tenure of the responding person, we estimate probit regressions with the dependent variable taking the value one if the permission was given and zero otherwise. Table 7 shows the marginal effects of these probit estimations. In column (1) we include a dummy on whether the answering person is a CEO and in column (2) we use the categorical information. The regressions reveal no statistically significant effect of gender or tenure on the probability to consent to linkage. However, the CEO dummy is highly significant and increases the probability to consent by 22 percent. Analogously, the probability decreases if somebody is not a CEO as shown in column (2).

Table 7: Probability to consent to linkage

Consent to Linkage	(1)	(2)
Gender (Female = 1)	0.017 (0.032)	0.031 (0.034)
Tenure	0.001 (0.001)	0.001 (0.001)
CEO	0.223*** (0.027)	baseline
Manager of multiple establishments		-0.202*** (0.061)
Manager of one establishment		-0.239*** (0.041)
Manager within an establishment		-0.215*** (0.041)
Non-Manager		-0.356** (0.065)
Observations	1,702	1,645

Notes: Marginal Effects of probit estimations. Controls are establishment size, industry and settlement. Robust standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on GMOP.

7.4 Linkage consent bias

To our knowledge, there is no study comparing consent rates amongst different German establishment surveys, but as far as our assessment goes, with a linkage consent rate of around 50 percent, the GMOP lies below average levels for establishment surveys. We therefore look at potential linkage consent bias, which might affect analyses with the GMOP-ADIAB (Sakshaug and Huber, 2016).

Table 8 shows descriptive statistics for all establishments (column (1)) and those who agreed to linkage (column (2)).¹² The last column displays the linkage consent bias, which is calculated as the difference between both group means (Sakshaug and Huber, 2016).

While not statistically significant, a negative linkage consent bias regarding the firm size, executive board, foreign direct investments (FDI), offshoring activities, foreign ownership and the existence of a works council can be observed. A positive but not statistically significant consent bias emerges in terms of exports, innovations, family ownership, collective agreements and the independence of the company. The fact that an establishment is an independent company is the only characteristic that significantly differs between the full data population and the linkage consenters. This result indicates that independent companies are more likely to consent to linkage. Independent companies generally have more decision-making power and a higher degree of responsibility for their decisions as they do not have to clarify them with superior departments (Janik and Kohaut, 2012). However, with only 3 percentage points the size of the consent linkage bias is not very high. As the differences indicated by Table 8 Column 3 are negligibly small and statistically not relevant, we conclude that there is no severe consent bias when working with the GMOP-ADIAB data.

¹² Compared to the analyses on the representativeness of the data in section 6.1, we now can only use survey information to not violate the linkage consent agreement.

Table 8: Linkage consent bias for selected variables

	(1) Full data		(2) Linkage consent		(3) Linkage consent bias
	N	Mean	N	Mean	
Employees	1,812	159.68	983	150.14	-9.54
Managers	1,867	13.33	1,004	12.86	-0.46
Non-Managers	1,828	147.40	990	138.47	-8.93
Executive board (D)	1,887	0.20	1,011	0.20	-0.01
FDI (D)	1,893	0.23	1,010	0.22	-0.01
Exports (D)	1,898	0.69	1,012	0.71	0.02
Offshoring (D)	1,598	0.16	850	0.14	-0.02
Innovations (D)	1,759	0.79	948	0.80	0.01
Foreign Ownership (D)	1,921	0.14	1,019	0.13	-0.01
Family Ownership (D)	1,882	0.60	998	0.61	0.01
Collective agreement (D)	1,890	0.40	1,008	0.42	0.01
Works council (D)	1,880	0.43	1,002	0.43	-0.00
Independent company (D)	1,911	0.79	1,016	0.82	0.03**

Notes: Not weighted. D indicates a dummy variable. Number of observations vary with variables due to missing observations. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on GMOP (only 2013).

8 Conclusion

The GMOP is a new establishment-level data set to analyze the use of management practices as well as their impact on firm performance. In this paper, we presented the GMOP survey design and gave an overview of the data set. We showed that the data is representative for German establishments in the manufacturing industry or the construction sector with 25 or more employees liable to social security contributions.

The survey was conducted in approximately 1,900 establishments and retrospectively refers to the years 2008 and 2013. In addition to analyses regarding management practices, the data can be used for the investigation of health and work-life balance measures. Potential outcome variables, such as sales, intermediates, international orientation, employment structures and innovation activity are available. Enhancing the GMOP with additional administrative data, the data set offers several further analysis potentials. Examples include the relationship between management practices and wage differentials, skill composition or employment stability. Due to the requirement of linkage agreement, calculations with linked data can only be carried out with approximately half of the observations. However, linkage consent bias analyses revealed that distortions tend to be small.

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