RESEARCH DATA CENTRE (FDZ)
of the German Federal Employment Agency (BA)
at the Institute for Employment Research (IAB)

FDZ-METHODENREPORT

Methodological aspects of labour market data

05|2020 EN Mode Effects in the Fourth Wave of the Linked Personnel Panel (LPP) Employee Survey

Jan Mackeben

Bundesagentur für Arbeit

Mode Effects in the Fourth Wave of the Linked Personnel Panel (LPP) Employee Survey

Jan Mackeben (Institute for Employment Research, Nuremberg)

Die FDZ-Methodenreporte befassen sich mit den methodischen Aspekten der Daten des FDZ und helfen somit Nutzerinnen und Nutzern bei der Analyse der Daten. Nutzerinnen und Nutzer können hierzu in dieser Reihe zitationsfähig publizieren und stellen sich der öffentlichen Diskussion.

FDZ-Methodenreporte (FDZ method reports) deal with methodical aspects of FDZ data and help users in the analysis of these data. In addition, users can publish their results in a citable manner and present them for public discussion.

Contents

List of figures

List of tables

Zusammenfassung

Die Beschäftigtenbefragung des Linked Personnel Panel (LPP) wurde bis zur vierten Welle telefonisch durchgeführt. In der vierten Welle wurden die Daten entweder telefonisch oder über das Internet erhoben. Die Befragungsergebnisse eines Surveys können vom Erhebungsmodus beeinflusst sein. Solche Moduseffekte zeigen sich oftmals innerhalb von Mixed-Mode Erhebungen und beschreiben eine Variation der Antworten über die eingesetzten Erhebungsmethoden. Die Hauptursache für diese Variationen bilden Selektionseffekte – diese setzen sich aus Coverage und Nonresponse zusammen – und Messeffekte. Die Daten der vierten Befragungswelle veranschaulichen zwei Befunde. Zum einen zeigen sich bei einigen Variablen Brüche in der Zeitreihe. Zum anderen variieren die Antworten innerhalb der vierten Welle bei einigen Variablen über die Erhebungsmethoden. Der erste Teil dieses Reportes zeigt Ursachen für diese Moduseffekte auf und verweist auf weiterführende Literatur. Daran anschließend werden Unterschiede zwischen der vierten Erhebungswelle und den Vorwellen hinsichtlich der Stichprobenzusammensetzung und der erzielten Antworten aufgezeigt. Abschließend werden die im ersten Teil beschriebenen Ursachen für Moduseffekte anhand der Daten der vierten Welle veranschaulicht.

Abstract

The employee survey of the Linked Personnel Panel (LPP) was conducted via telephone during the first three waves. In wave four the data was either collected via telephone or alternatively via web. The survey mode can influence the survey results. Mixed mode results often reveal this mode effect. Mode effects represent a varying response distribution over survey modes. The major causes for mode effects are selection effects and measurement effects. Selection effects are a combination of coverage and nonresponse. The survey outcomes of the fourth wave demonstrate two noteworthy results, which should be considered when working with the LPP. First, the distribution of several panel variables differs between wave four and earlier waves. Second, there are mode effects in the fourth wave of the employee survey. In the first part, this report describes the causes for mode effects and refers to studies that are more detailed. The second part highlights differences in response and sample distribution between a) wave four and prior waves and b) web and telephone interviews in the fourth wave.

Keywords

Linked Personnel Panel, employee survey, coverage, nonresponse, measurement, selection

Acknowledgement

The author would like to thank Tobias Haepp, Silvia Schwanhäuser, Patrick Gleiser, Philipp Grunau and Kevin Ruf for helpful comments and suggestions. Furthermore, the author would like to thank Laura Weber and Nele Theilacker for editing and literature review.

1 Introduction

Collecting survey data about employees is a crucial component of employment research. Since the results of employee surveys are key factors used for decision-making in politics and economics, a high data quality is required. Data can be collected by telephone, face-to-face, web, mail or other modes of data collection. Each interview mode has its own strengths and weaknesses (Tourangeau 2017; de Leeuw 2018). For decades, surveys were conducted using single modes, such as telephone and face-to-face (Sen & Bricka 2013; Schnell 1997). However, falling response rates could be observed for all survey modes and especially for telephone surveys (Kennedy & Hartig 2019; Schnell 2019; Groves et al. 2009). Technological developments—increasing use of caller id screening, call blocking and answering machines (Tourangeau 2004; Federal Office of Statistics 2019)—and social changes may have contributed to this. Meanwhile, internet coverage increased rapidly in western countries (Federal Office of Statistics 2019; Ryan 2016). Therefore, the web mode is nowadays frequently used as a supplement to interviewer-administered modes in order to exploit the strengths of each mode and especially to reduce survey costs and increase data quality (Galesic, Tourangeau & Couper 2006; de Leeuw 2018; Tourangeau 2017; Olson et al. 2020).

Many large-scale longitudinal surveys have switched from interviewer-administered single-mode to a mixed-mode design that includes web. Examples are the UK Household Longitudal Study (Carpenter 2017), the IAB Establishment Panel (Bechmann et al. 2018) and the German Microcensus (Federal Office of Statistics 2020). Other surveys like the European Social Survey (ESS) are currently testing a change from an interviewer-administered mode to a mixed-mode design, including web (Villar & Fitzgerald 2017).

There are several ways to implement a mixed-mode design. The modes in a mixed-mode survey can either be offered alternatively (concurrent design) or sequentially (Couper 2011). A sequential design can result in a higher response rate compared to a concurrent design, especially if both designs include web (Dykema et al. 2012; Medway & Fulton 2012; Millar & Dillman 2011). Additionally, a sequential design can reduce survey costs, since sample units can be pushed to the most cost-efficient mode (Robert Koch-Institut 2015). These aspects may have contributed to the fact that telephone surveys mostly changed to sequential mixed-mode design rather than to a concurrent mixed-mode design (Olson et al. 2020).

However, the combination of interviewer-administered and self- administered modes for data collection can impact data quality. For instance, mixing modes can influence coverage, nonresponse, and measurement error of survey estimates (de Leeuw 2005; Dillman, Smyth & Christian 2009; de Leeuw 2018). This report aims to sensitize researchers interested in working with the Linked Personnel Panel (LPP) to mode effects in the fourth survey wave. It will not provide a statistical method to adapt the results of the fourth wave to the results of the earlier waves. The paper is structured into four parts. The following chapter describes reasons for mode differences. The data and the decision of moving to mixed-mode is described in the third section. The fourth part shows some mode differences.

2 Mode effects: a review of literature

Mixed-mode surveys can be affected by varying response distributions across survey modes. This can be caused by various sources. The main sources are coverage, nonresponse, sampling or measurement effects (de Leeuw 2005; Couper 2011). The focus of research are the selection effect—this is the combination of nonresponse and coverage—and the measurement effect (Schouten et al. 2013). Selection disparities occur if persons were randomly assigned to single modes and the composition of respondents differs between survey modes. There are many causes for measurement effects. An example could be if the responses in web were more honest compared to telephone (Cernat 2015). The risk of mode differences differs between questions (Jäckle, Robters & Lynn 2010). To understand the extent of each source, selection and measurement effects between modes have to be disentangled (Vandenplas, Loosveldt, Vannieuwenhuyze 2016). During the last years, many statistical methods have been developed to separate these effects (Vannieuwenhuyze, Loosveldt & Molenberghs 2010; Vannieuwenhuyze & Loosveldt 2012; Vannieuwenhuyze, Loosveldt & Molenberghs 2014; Cernat 2015; Vandenplas, Loosveldt & Vannieuwenhuyze 2016). This report does not develop or test such a statistical methods. Rather, in the following section it will show the differences between telephone and web surveys with respect to selection and measurement effects.

Many studies have revealed selection effects between telephone and web surveys (Revilla 2010; Lugtig et al. 2011). There are several causes for selection effects. First, some demographic groups have higher response rates in every survey mode compared to their demographic counterparts. However, the extent of these differences varies across modes. For instance, if persons (Link & Mokdad 2005; Laaksonen & Heiskanen 2014; Cernat, Couper & Ofstedal 2016) or households (Lugtig et al. 2011) were randomly assigned to modes in single-mode surveys or offered different concurrent modes (Krug, Kriwy & Carstensen 2014; Brøgger et al. 2007), the proportion of higher educated individuals is higher within a) respondents than nonrespondents and b) web compared to other modes. Second, some characteristics have an opposing influence on survey participation across the modes. For instance, employees working part-time are overrepresented in telephone surveys (Sakshaug & Eckman 2017), while a mixed-mode design including web produces an overrepresentation of full-time employees (Sakshaug et al. 2017). Moreover, employees who are living close to their workplace or work part-time are more likely to participate via telephone compared to web. On the other hand, people who are commuting, working full-time and have a job in business or administration have a higher chance to participate via web compared to telephone (Mackeben & Sakshaug 2020).

The survey mode itself can have an influence on the answers (measurement effect). The main reason behind this is that the form of communication differs between both modes. While telephone surveys are based on aural communication, web surveys are based on visual communication (Dillman & Christian 2005). The following section provides a brief overview of common causes for measurement-effects. Such causes are social desirability, satisficing and recency or primacy effects.

Responses collected by telephone are consistently influenced by social desirability and more likely to be positive compared to those collected on the web (Dillman et al. 2009). According to the current state of research, this applies to many topics, such as health-related items (Elliott et al. 2009; Cernat, Couper & Olfstedal 2016), personal lifestyle questions (Greene, Speizer & Wiitala 2008) and customer questions (Ye, Fulton & Tourangeau 2011). The visual communication can reduce memory and cognitive efforts in web surveys. This is not possible in telephone surveys (Möhring & Schütz 2010; de Leeuw & Hox, 2011). In line with this, Chang and Krosnick (2009) found a lower level of satisficing in web responses compared to telephone. These findings are in line with Cernat, Couper and Olfstedal (2016) who report higher levels of physical activity in web modes, consistent with higher recency effects in aural modes.

In general, the research findings suggest that measurement differences are mostly introduced by the way people answer questions in different modes. Thus, the same respondent could answer differently in different modes (Klausch, Hox & Schouten 2013; Eisenmann et al. 2018; Martin & Lynn 2011).

3 The Linked Personnel Panel (LPP)

The data used in this report comprises the fourth wave outcomes of the Linked Personnel Panel (LPP) employee survey. The LPP is a linked employer-employee panel survey, which is designed for research on personnel economics by simultaneously observing the employer and employee perspective. The LPP evolves within the research project ”Quality of work and economic success: longitudinal study in German establishments”. The project is a research cooperation between the Institute for Employment Research (IAB), the University of Cologne, the Eberhardt-Karls-University of Tuebingen and the Centre for European Economic Research (ZEW). The project is funded by the IAB and the Federal Ministry of Labour and Social Affairs (BMAS). The LPP is representative of German private sector establishments with at least 50 employees subject to social security and their employees.

The employer survey, which is the first segment of the LPP, is a follow-up survey of the IAB Establishment Panel (Ruf et al. 2020) and collects data about human resources, remuneration structure and commitment, values and corporate culture. These topics remained constant over all waves but vary in their extent. The Kantar Public institute was responsible for conducting the establishment survey, including data review and weighting. Detailed information about the employer survey can be found in the method reports (Tschersich & Gensicke 2015, 2016a, 2016b & 2018)[1]. The employee survey — which covers topics like health, work conditions and workloads — forms the second part of the LPP. The data collection of each wave was conducted by the Institute for Applied Social Sciences (infas). The target of the LPP Employee Survey is to reflect and expand core aspects from the establishment level to the employee level. Moreover, the data set provides comprehensive possibilities for analyses apart from the linkage. A detailed description of each survey

[1] The method reports are available on: https://fdz.iab.de/en/Integrated_Establishment_and_Individual_Data/lpp/LPP1617.aspx

wave can be found in the method reports (Schütz et al. 2015, 2016, 2017 & 2019)[2]. Access to the LPP data can be granted to researchers addressing topics concerning labour market research. Researchers can either use the survey data (Ruf et al. 2020) or the survey data linked with administrative data from the Integrated Employment Biographies (IEB) of the IAB (Mackeben et al. 2019). Both data products are available for on-site use and via remote data processing.

4 Transition to mixed mode in wave four

Over the first three waves, the data collection of the employee survey was conducted via telephone. The field period of each wave lasted at least four months. In the first wave, three months after the end of the field period of the employer survey, a random sample of employees was drawn from the responding establishments. Due to panel attrition, refreshment samples of employees were drawn in wave two, three and four from the responding establishments in these waves. Persons who took part in one wave were re-contacted in the following waves. In every wave, telephone numbers are only available for a selective group of the gross sample. These are people who had contact with the German Federal Employment Agency (BA) in the past and provided their telephone number, which is not mandatory. These are for instance employees, who a) became job seekers or b) received earnings replacement benefits from the BA. Since a high response rate is required and the group of employees who have never had contact with the BA could differ from persons with a known telephone number, infas also conducted telephone number research, especially for cases with old or unknown phone numbers.

Table 1 shows that an increasing share of the gross sample could not be contacted by telephone, since the telephone numbers could not be found for these persons. Moreover, the table highlights a declining response rate within the refreshment sample from 24.45 percent in wave one to 14.80 per cent in wave two and 12.09 percent in wave three. This finding is consistent with the generally declining response rate in telephone surveys (Kennedy & Hartig 2019).

Table 1: Response Rates and Cases with Unknown Telephone Number

	Wave 1	Wave 2	Wave 3
Response Rate (%)			
Panel sample ((%)		56.87	52.90
Refreshment sample	24.45	14.80	12.09
Unknown telephone number (%)			
Refreshment sample	24.35	28.19	34.96

Note: Response-Rates 1 were calculated according to the AAPOR standard (AAPOR 2016)
Source: Schütz et al. 2015, 2016, 2017.

[2] The method reports are available on: https://fdz.iab.de/en/Integrated_Establishment_and_Individual_Data/lpp/LPP1617.aspx

Employees with an unknown number could differ systematically from employees with known number on certain characteristics. Table 2 compares the composition of employees with known and unknown telephone number in terms of gender, age, citizenship, education, employment status and daily earnings. Since the inclusion of panel cases could distort this comparison, only refreshment cases are included in the table. The characteristics are available for the whole refreshment sample, since they originate from administrative data. These data were drawn from the IEB of the IAB. Further information about the IEB and its different sources can be found in Oberschachtsiek et al. (2009). In general, there are significant differences between employees with and without known telephone numbers. For example, the proportion of females is significantly higher in the group with unknown telephone number than in the group with known telephone number in each wave. Moreover, employees with a known telephone number are younger and have a lower income compared to employees with an unknown telephone number. These effects are highly significant.

Table 2: Comparison of Employees with Known and Unknown Telephone Number

	Wave 1			Wave 2			Wave 3		
Variables	Sample	Telephone		Sample	Telephone		Sample	Telephone	
		No	Yes		No	Yes		No	Yes
Gender									
Female	28.78	29.78	28.35	29.72	30.93	29.24	29.94	30.66	29.55
Male	71.22	70.22	71.65	70.28	69.07	70.76	70.06	69.34	70.45
χ^2-test		Pr =0.002			Pr = 0.004			Pr = 0.040	
Citizenship									
German	91.77	91.68	91.81	91.33	91.52	91.25	91.48	91.40	91.52
Non-German	8.23	8.32	8.19	8.67	8.48	8.75	8.52	8.6	8.48
χ^2-test		Pr = 0.673			Pr = 0.449			Pr = 0.712	
University degree									
Yes	35.59	36.33	35.28	35.71	35.34	35.85	35.69	36.17	35.43
No	64.41	63.67	64.72	64.29	64.66	64.15	64.31	63.83	64.57
χ^2-test		Pr = 0.036			Pr = 0.405			Pr = 0.191	
Employment status									
Full-time	87.05	87.57	86.81	86.73	87.68	86.36	86.30	87.30	85.76
Part-time	12.95	12.43	13.19	13.27	12.32	13.64	13.7	12.7	14.24
χ^2-test		Pr = 0.061			Pr = 0.002			Pr = 0.000	
Age (mean)	43.60	44.58	43.16	44.79	47.06	43.89	45.57	47.02	44.80
T-test		Pr = 0.0000			Pr = 0.0000			Pr = 0.0000	
Daily earnings (mean)	103.52	115.60	98.35	106.96	121.20	101.36	105.69	118.53	98.73
T-test		Pr = 0.0000			Pr = 0.0000			Pr = 0.0000	
N	37,831	9,211	28,620	30,074	8,478	21,596	31,616	11,053	20,563

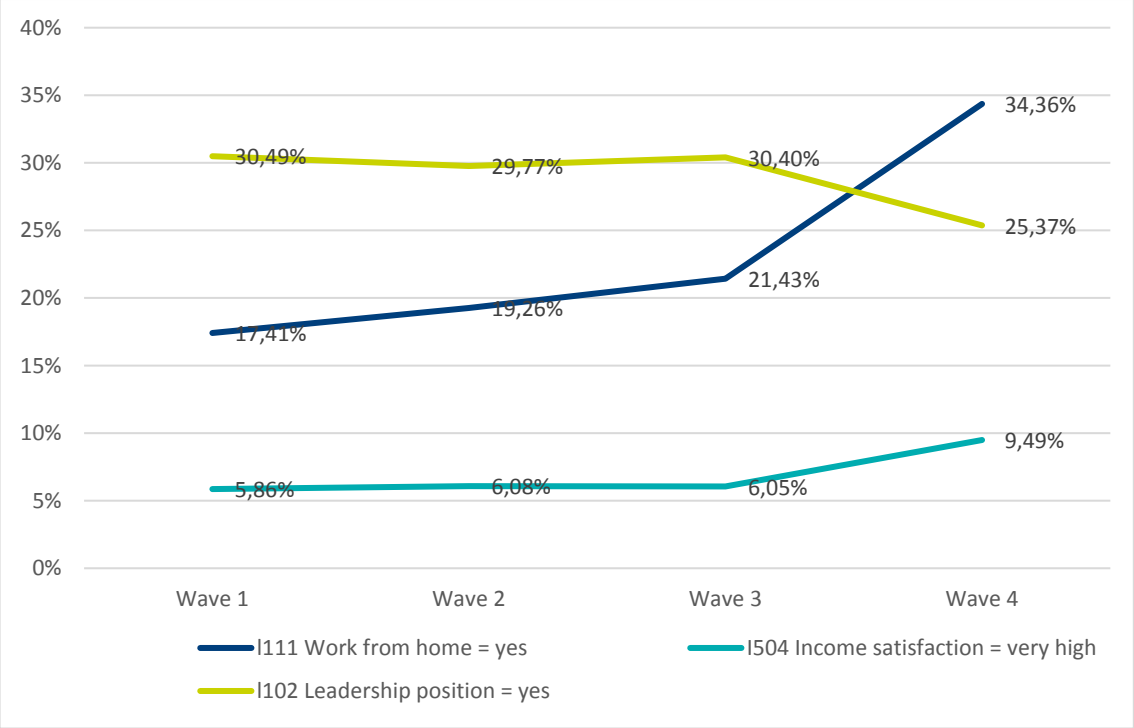
Note: χ^2-tests are a comparison between the group with known and the group with unknown telephone number.
T-tests are calculated as two-sample mean comparison.
Source: Linked Personnel Panel and IEB, own calculations.

Due to decreasing response rates and the undercoverage of certain demographic groups, the LPP research team decided to introduce a second survey mode. Since employees spend less time at home, are more occupied during the day (Knabe et al. 2009), and are therefore harder to contact compared to unemployed persons by telephone (Asef & Riede 2006), the research team decided to use a self-administered mode. This offers the employees to participate at any time of the week. Since the internet coverage increased rapidly in western countries (Federal Office of Statistics 2019; Ryan 2016), the web mode was chosen. As we will see in the next chapter, the reduced coverage bias must be weighed against mode differences that occur on some variables.

5 Mode Effects in LPP Wave Four

The frequency tables of all variables included in the four LPP employee survey waves are available on the IAB-website[3]. Overall, the frequency tables and the results of this report show no or only small differences in response distribution between a) wave four and the previous waves and b) telephone and web in wave four. Thus, the LPP enables researchers to conduct a variety of panel analyses. However, there are distributional changes on some variables between wave four and the earlier survey waves. Figure 1 illustrates this for specific variables. For instance, the share of employees working from home increases rapidly from 21.43 per cent in wave three up to 34.36 per cent in wave four. Up to wave three, there was only a slight increase between the survey waves. Additionally, there is a lower proportion of employees in a leadership position compared to earlier waves. Moreover, the proportion of employees with a very high income satisfaction[4] increased in wave four.

Figure 1: Response Distribution for Selected Variables



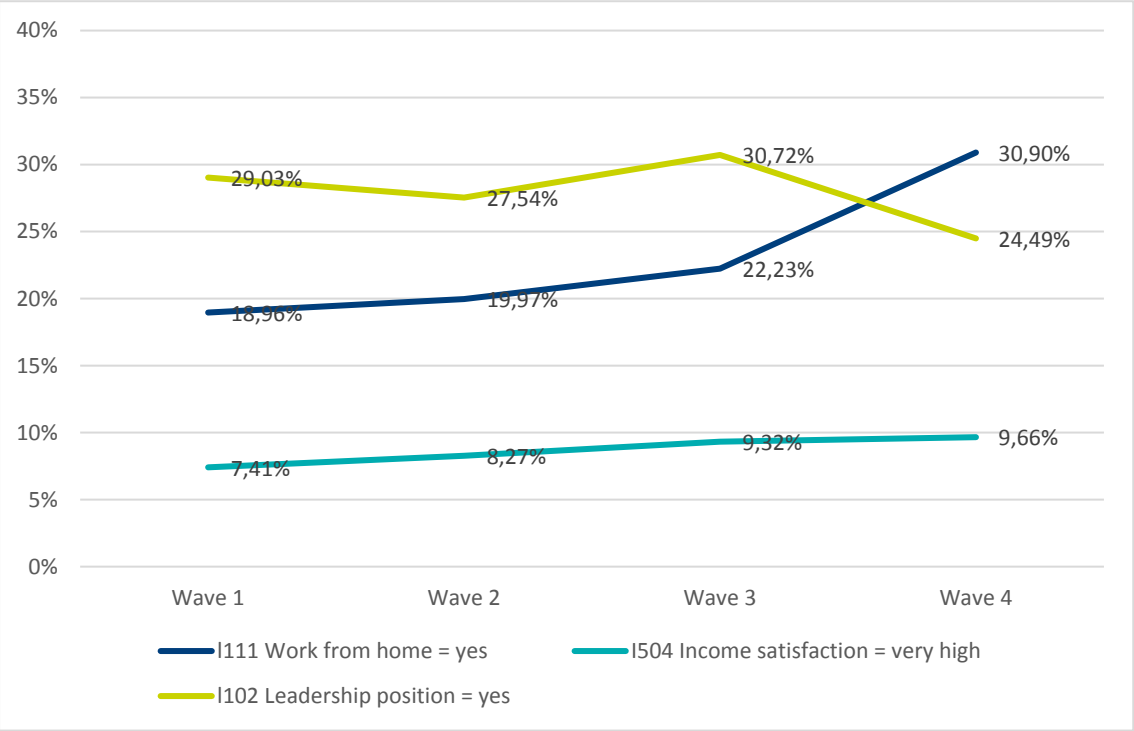
Note: the number of respondents varies due to item nonresponse.
N: w1: 7,496-7,507; w2: 7,102-7,108; w3: 6,420-6,427 w4: 6,217-6,220.
Source: Linked Personnel Panel, own calculations.

The inclusion of survey weights— shown in Figure 2— can reduce the differences. The variable for leadership position is an exception, as the difference between wave three and four increases when weights are taken into account. There are many potential explanations for this. In the following

[3] The frequencies can be found on: https://fdz.iab.de/en/Integrated_Establishment_and_Individual_Data/lpp/LPP1617.aspx
[4] The income satisfaction was measured on a scale from 0 “very low” to 10 “very high”.

chapters, some of them will be discussed. Further information about the survey weights can be found in the method reports (Schütz et al. 2015, 2016, 2017 & 2019)[5].

Figure 2: Weighted Response Distribution for Selected Variables



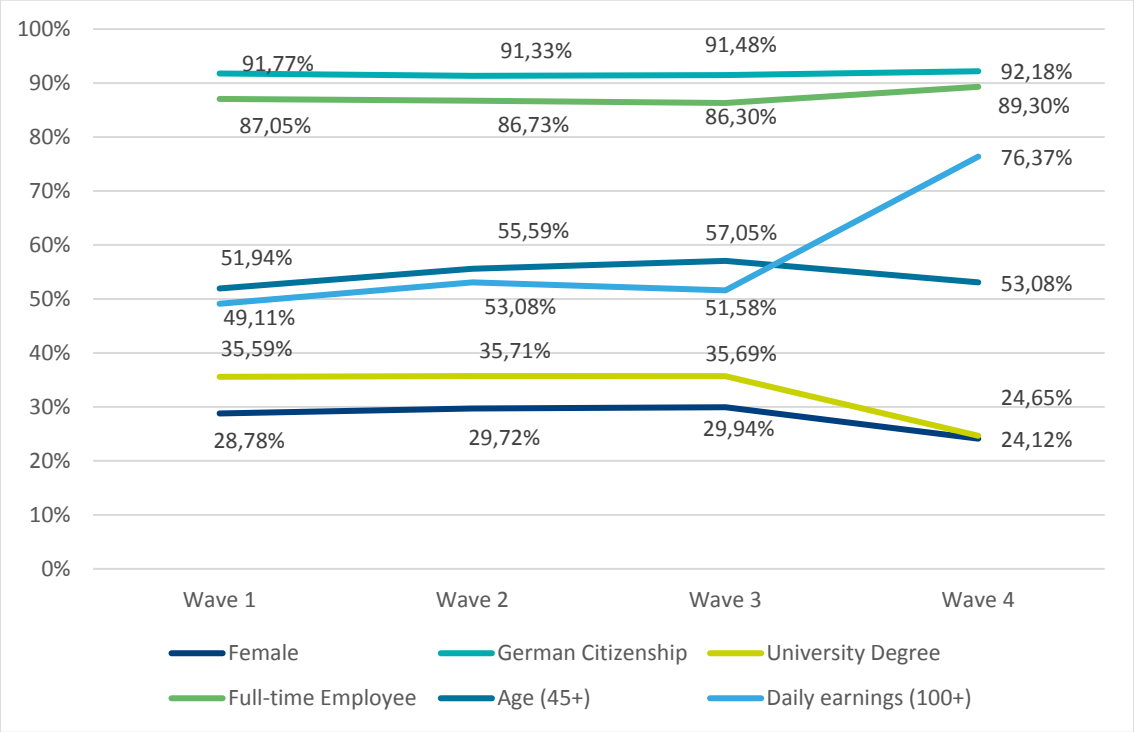
Note: the number of respondents varies due to item nonresponse varies.
N: w1: 7,496-7,507; w2 7,102-7,108; w3: 6,420-6,427 w4: 6,217-6,220.
Source: Linked Personnel Panel, own calculations.

5.1 Sample composition

Figure 3 displays the refreshment sample composition of each wave. The data used stem from the IEB. There are differences in the composition of the refreshment sample between wave four and earlier waves. The deletion of cases with unknown telephone number has no influence on this. These cases are taken into account in each wave. A key variable that changed is the proportion of employees with a university degree. This share is around 35 percent in each wave, but decreases to 24.65 percent in wave four. Unexpectedly, the proportion of employees earning more than 100 Euro per day is higher than in the previous waves. Moreover, the proportion of females is lower in wave four compared to the earlier waves. The modified sampling system and the employee structure in some German industry sectors may contributed to this.

[5] The method reports are available on: https://fdz.iab.de/en/Integrated_Establishment_and_Indiviual_Data/lpp/LPP1617.aspx

Figure 3: Refreshment Sample Composition



Note: (n: w1: 37,831, w2: 30,074, w3: 31,616, w4: 24,840).
Mean age: (years: w1: 43.6, w2: 44.8, w3: 45.6, w4_ 44.7), Mean earnings (euro: w1: 103.5, w2: 106.9, w3: 105.7, w4: 143.7).
Source: Linked Personnel Panel and IEB, own calculations.

5.2 Selection effects

Table 3 deals with selection effects in wave four. The underlying data originates from the IEB. The first column shows the distribution of selected characteristics in the gross sample. Columns two and three compare the distribution of the characteristics between employees with known and unknown telephone number. The fourth and fifth column represents the distribution of the variables separately for telephone and web respondents. Finally, column six includes all respondents. According to the table, employees who are female have no university degree and German citizenship are significantly more likely to have a known telephone number, compared to their demographic counterparts. Additionally, employees with known telephone number are younger, live in bigger cities and have a lower income compared to employees with unknown telephone number. These differences are highly significant. The table reveals that a single mode telephone survey would have yielded an undercoverage of certain sociodemographic groups. However, the findings are not consistent with earlier waves. For instance, the likelihood of having a known telephone number was significantly lower for females compared to males in the first three waves.

According to Table 3, employees who are older, have a university degree and German citizenship have a higher response rate in both modes compared to their demographic counterparts. However, the effects of these characteristics on the response rate are larger in web than in telephone. Additionally, the telephone mode yielded an overrepresentation of females, part-time workers

and employees earning less than the mean income. In contrast to this, males, full-time employees and employees earning more than the mean income are overrepresented in the web mode. The demographic differences between web and telephone respondents are statistically significant for all included variables. Thus, there are selection effects in wave 4.

Table 3: Selection Effects in Wave Four

Variable	Sample	Telephone		Respondents		
		No	Yes	Tel.	Web	All
Gender						
Female	24.12	22.87	25.03	29.08	22.96	24.18
Male	75.88	77.13	74.97	70.92	77.04	75.82
χ^2-test		Pr = 0.000		Pr = 0.001		
Citizenship						
German	92.18	91.62	92.58	95.54	96.86	96.59
Non-German	7.82	8.38	7.42	4.46	3.14	3.41
χ^2-test		Pr = 0.006		Pr = 0.097		
University degree						
Yes	24.65	28.59	21.79	32.31	41.01	39.28
No	75.35	71.41	78.21	67.69	58.99	60.72
χ^2-test		Pr = 0.000		Pr = 0.000		
Employment status						
Full-time	89.30	89.82	88.92	85.69	91.15	90.06
Part-time	10.70	10.18	11.08	14.31	8.85	9.94
χ^2-test		Pr = 0.022		Pr = 0.000		
Age (mean)	44.73	47.65	42.61	45.41	46.97	46.66
T-test		Pr = 0.000		Pr = 0.000		
Daily earnings (mean)	143.72	159.79	132.06	138.40	166.16	160.63
T-test		Pr = 0.000		Pr = 0.000		
Urbanity (mean)	165,451	159,907	169,475	150,462	141,622	143,385
T-test		Pr = 0.000		Pr = 0.000		
N	24840	10447	14393	650	2609	3259

Note: χ^2-tests in column two are a comparison between the group with known and the group with unknown telephone number.
χ^2-tests in column five are a comparison between web and telephone.
T-tests are calculated as two-sample mean comparison.
Source: Linked Personnel Panel, own calculations.

5.3 Measurement effect

In general, the mode-separated frequencies[6] of the fourth employee survey wave demonstrate similar responses between telephone and web respondents for the majority of questions. However, the variable distribution varies between the survey modes on some items. Table 4 shows the

[6] The frequencies can be found on: https://fdz.iab.de/en/Integrated_Establishment_and_Individual_Data/lpp/LPP1617.aspx

unweighted (columns one and two) and weighted (columns three and four) percentages of respondents who choose the most positive category in each mode. Panel cases were not excluded from this table. The table demonstrates two key findings. First, telephone respondents are more likely to choose the most positive category compared to web respondents. Second, including the survey weights does not change this. The differences between web and telephone responses are highly significant for all listed questions.

Table 4: Percentage of Respondents Choose Most Positive Category

	Unweighted		Weighted	
Variables	Tel.	Web	Tel.	Web
I211: Appraisal interview(s) found useful	35.52	20.87	35.44	21.25
I213b: Agreement: influence on achievement of objectives	40.10	25.54	40.63	23.55
I501d: Cooperate Culture: good guidance	15.47	5.17	16.49	4.77
I605f: Big Five: forgiving	37.38	23.27	37.52	24.26
I703a: Collegiality: help colleagues	15.75	6.09	16.23	5.82

Note: The differences between telephone and web are significant for all questions ($p < 0.001$).
The number of respondents varies due to item nonresponse varies and filter questions.
N: telephone: 650-2,508; web 1,652-3,712.
Source: Linked Personnel Panel, Own Calculations.

Moreover, there are some variations in the response distributions, for which the sources are not clear. One notable example are the questions I702 and I704. Table 5 shows that the mean number of sick days and the number of days on which the respondent went to work sick is significantly higher in telephone mode compared to web mode. Again, the inclusion of survey weights does not change this. However, it remains unclear if the mentioned differences are measurement effects, selection effects or a combination of both.

Table 5: Mode Differences

	Unweighted				Weighted			
	Tel.		Web		Tel.		Web	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD
I702: Sick days	13.59	27.44	10.37	21.38	13.09	24.52	10.57	22.56
I704: Went to work sick	10.11	25.89	7.56	17.58	10.60	25.50	8.14	18.74

Note: The differences between telephone and web are significant for all questions ($p < 0.001$).
The number of respondents varies due to item nonresponse.
N: telephone: 2,351-2,357; web 3,644-3,667.
Source: Linked Personnel Panel, Own Calculations.

6 Discussion

This is the first report analyzing mode effects in the fourth wave of the LPP employer survey. The results can be summarized in two main points.

First, in a few cases the response distribution differs between wave four and earlier waves. Second, there are mode effects in the fourth wave of the LPP employee survey. However, in the data of the fourth wave of the LPP employee survey are of high quality. There are only a few differences between a) web and telephone b) wave four and the previous waves. Our findings suggest that there are three key causes for the two mentioned differences. First, the sample in wave four contains a higher percentage of females and persons without university degree compared to earlier waves. One would expect that income increases with education. Due to our sampling system and the payment system in some industries, this is not the case. Second, there are selection effects between web and telephone in wave four. For instance, female part-time employees are more likely to participate via telephone compared to web. Other research shows that commuting plays also an important role (Mackeben & Sakshaug 2020). Third, our results suggest measurement differences between the survey modes. One example is that telephone respondents are more likely to choose the most positive category compared to web respondents.

The objective of this report was to raise awareness among researchers using the LPP of the differences between modes and between survey waves in terms of their response distributions. Some results indicate higher data quality for some variables in wave four compared to previous waves. One reason for this is that the combination of web and telephone reduces the nonresponse bias for administrative variables. Today, many surveys are switching to a mixed-mode design (Olson et al. 2020). Therefore, the analyses in this report may also be relevant to other surveys.

References

Asef, D., Riede, T. (2006). Kontaktzeit in einer Telefonerhebung – wie beeinflussen sie die Messung der Erwerbstätigkeit?. In: Statistisches Bundesamt (Hrsg.), Wirtschaft und Statistik (pp. 581-586).

Bechmann, S., Tschersich, N., Ellguth, P., Kohaut, S., Baier, E., Bogner, M. (2018). Technical Report on the IAB Establishment Panel – Wave 26 (2018). Nuremberg: Research Data Centre (FDZ).

Brøgger, J., Nystad, W., Cappelen, I., Bakke, P. (2007). No Increase in Response Rate by Adding a Web Response Option to a Postal Population Survey: A Randomized Trial. Journal of Medical Internet Research, 9(5)e40, 1-9.

Carpenter, H. (2017). UK Household Longitudinal Study. Wave 7 technical report. Kantar Public, London.

Cernat, A. (2015). Using equivalence testing to disentangle selection and measurement in mixed modes surveys. Institute for Social and Economic Research, University of Essex, Understanding Society Working Paper Series 2015(1).

Cernat, A., Couper, M., Ofstedal, M.B. (2016). Estimation of Mode Effects in the Health and Retirement Study using Measurement Models. Journal of Survey Statistics and Methodology, 2016(4), 501-524.

Chang, L., Krosnick, J.A. (2008). National Surveys Via RDD Telephone Interviewing vs. the Internet: Comparing Sample Representativeness and Response Quality. Public Opinion Quaterly, 73(4), 1-38.

Couper, M.P. (2011). The Future of Modes of Data Collection. Public Opinion Quarterly, 75(5), 889-908.

De Leeuw, E.D. (2005). To Mix or Not to Mix Data Modes in Surveys. Journal of Official Statistics, 21(2), 233-255.

De Leeuw, E.D., Hox, J.J. (2011). Internet Surveys as Part of a Mixed-Mode Design. In: Das, M., Ester, P., Kaczmirek, L. (Eds.), Social and Behavioral Research and the Internet (pp. 45-76). New York: Taylor & Francis Group.

De Leeuw, E.D. (2018). Mixed-Mode: Past, Present, and Future. Survey Research Methods, 12(2), 75-89.

Dillman, D.A., Christian, L.M. (2005). Survey as a Source of Instability in Responses across Surveys. Field Methods, 17(1), 30-52.

Dillman, D.A., Smyth, J.D., Christian, L.M. (2009). Internet, Mail, and Mixed-Mode Surveys: The Tailored Deign Method. Hobok, New Jersey: John Wiley & Sons.

Dillman D.A., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J., Messer, B.I. (2009). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (VCR) and the Internet. Social Science Research, 2009(1), 1-18.

Dykema, J., Stevenson, J., Klein, L., Kim, Y., Day, B. (2012). Effects of E-Mailed Versus Mailed Invitations and Incentives on Response Rates, Data Quality, and Costs in a Web Survey of University Faculty. Social Science Computer Review, 31(3), 359-370.

Eisenmann, C., Chlond, B., Minster, C., Jödden, C., Vortisch, P. (2018). Assessing the effects of a mixed-mode design in a longitudinal household travel survey. Transportation, 54(5), 1-17.

Elliott, M.N., Zaslavsky, A.M., Goldstein, E., Lehrman, W., Hambarsoomians, K., Beckett, M.K., Giodano, L. (2009). Effects of Survey mode, Patient Mix, and Nonresponse on CAHPS Hospital Survey Scores. Health Services Research 44(2), Part 1, p. 501-518.

Federal Office of Statistics (2019). Statistisches Jahrbuch 2019. Reviewed from: https://www.destatis.de/DE/Themen/Querschnitt/Jahrbuch/statistisches-jahrbuch-2019-dl.pdf;jsessionid=51AF6F63982D9C7BE6EDE0D937EA503A.internet8741?__blob=publicationFile.

Federal Office of Statistics (2020). Was ist der Mikrozensus. Reviewed from: https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Haushalte-Familien/Methoden/mikrozensus.html.

Galesic, M., Tourangeau, R., Couper, M. (2006). Complementing Random-Digit-Dial Telephone Surveys with Other Approaches to Collecting Sensitive Data. American Journal of Preventive Medicine, 31(5), 437-443.

Greene, J., Speizer, H., Wiitala, W. (2008). Telephone and Web: Mixed-Mode Challenge. Health Services Research 43(1), Part 1, 230-248.

Groves, R.M., Fowler, F.J., Couper, M.P., Lepkowski, J.M., Singer, E., Tourangeau, R. (2009). Survey Methodology. Hoboken, New Jersey: John Wiley & Sons.

Jäckle, A., Roberts, C., Lynn, P. (2010). Assessing the Effect of Data Collection Mode on Measurement. International Statistical Review, 78(1), 3-20.

Kennedy, C., Hartig, H. (2019). Response rates in telephone surveys have resumed their decline. Reviewed from: https://www.pewresearch.org/fact-tank/2019/02/27/response-rates-in-telephone-surveys-have-resumed-their-decline/.

Klausch, T., Hox, J., Schouten, B. (2013). Measurement Effects of Survey Mode on the Equivalence of Attitduinal Rating scale Questions, Sociological Methods & Research 42(3) 227-263.

Knabe, A., Rätzel, S., Schöb, R., Weimann, J. (2009). Dissatisfied with Life, but Having a Good Day: Time-Use and Well-Being of the Unemployed. CESido Working Paper, 2604, Munich.

Krug, G., Kriwy, P., Carstensen, J. (2014). Mixed-Mode Designs bei Erhebungen mit sensitiven Fragen: Einfluss auf das Teilnahme- und Antwortverhalten. LASER Discussion Papers, 84.

Laaksonen, S., Heiskanen, M. (2014). Comparison of Three Modes for a Crime Victimization Survey. Journal of Survey Statistics and Methodology, 2, 459-483.

Link, M.W., Mokdad, A.H. (2005). Alternative Modes for Health Surveillance Surveys: An Experiment with Web, Mail, and Telephone. Epidemiology, 16(5), 701-704.

Lugtig, P., Lensvelt-Mulders, G.J.L.M., Frerichs, R., Greven, A. (2011). Estimating nonresponse bias and mode effects in a mixed-mode survey. International Journal of Market Research, 53(5), 669-686.

Mackeben, J., Ruf, K., Haepp, T., Wolter, S., Grunau, P. (2019). Linked Personnel Panel survey data linked with administrative data from the IAB (LPP-ADIAB) 1975-2017. FDZ-Datenreport 07/2019 (en), Nürnberg, 81 S.

Mackeben, J. & Sakshaug, J.W. (2020). Does combining web and telephone in a sequential mixed-mode design affect nonresponse: Results from a German employee survey. Unpublished research paper.

Martin, P., Lynn, P.. (2011). The effects of mixed mode survey designs on simple and complex analyses. Institute for Social and Economic Research (ISER), University of Essex, Working Paper Series 2011(28).

Medway, R.L., Fulton, J. (2012). When More Gets You Less: A Meta-Analysis of the Effect of Concurrent Web Options on Mail Survey Response Rates. Public Opinion Quarterly, 76(4), 733-746.

Millar, M.M., Dillman, D.A. (2011). Improving Response to Web and Mixed-Mode Surveys. Public Opinion Quarterly, 75(2), 249-269.

Möhring, W., Schlütz, D. (2010). Die Befragung in der Medien- und Kommunikationswissenschaft. Eine praxisorientierte Einführung, 2., überarbeitete Auflage. Wiesbaden: VS Verlag für Sozialwissenschaftler.

Oberschachtsiek, Dirk; Scioch, Patrycja; Seysen, Christian; Heining, Jörg (2009). Stichprobe der Integrierten Erwerbsbiografien IEBS * Handbuch für die IEBS in der Fassung 2008. FDZ-Datenreport, 03/2009 (de), Nürnberg, 59 S.

Olson, K., Smyth, J.D., Horwitz, R., Keeter, S., Lesser, V., Marken, S., Mathiowetz, N.A., McCarthy, J.S., O'Brien, E., Opsomer, J.D., Steiger, D., Sterrett, D., Su, J., Suzer-Gurtekin, T., Turakhia, C., Wagner, J. (2020). Transition From Telephone Surveys to Self-Administered and Mixed-Mode: Aapor Task Force Report. Reviewed from: Reviewd from: https://www.pewresearch.org/fact-tank/2019/02/27/response-rates-in-telephone-surveys-have-resumed-their-decline/.

Revilla, M. (2010). Quality in Unimode and Mixed-Mode designs: A Multitrait-Multimethod approach. Survey Research Methods, 4(3), 151-164.

Robert Koch-Institut (2015). Beiträge zur Gesundheitsberichterstattung des Bundes. Pilotstudie zur Durchführung von Mixed-Mode-Gesundheitsbefragungen in der Erwachsenenbevölkerung (Projektstudie GEDA2.0). Berlin.

Ruf, K., Mackeben, J., Haepp, T., Wolter, S., Grunau, P. (2020). LPP - Linked Personnel Panel 1819. Arbeitsqualität und wirtschaftlicher Erfolg: Längsschnittstudie in deutschen Betrieben. FDZ-Datenreport.

Ryan, C. (2016). Computer and Internet Use in the United States: 2016. American Community Survey Reports. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau, Washington.

Sakshaug, J.W., Eckman, S. (2017). Are Survey Nonrespondents Willing to Provide Consent to Use Administrative Records? Evidence from a Nonresponse Follow-Up Survey in Germany. Public Opinion Quarterly, 81(2), 495-522.

Sakshaug, J.W., Hülle, S., Schmucker, A., Liebig, S. (2017). Exploring in the Effects of Interviewer- and Self-Administered Survey Models on Record Linkage Consent Rates and Bias. Survey research Methods, 11(2), 171-188.

Schütz, Holger; Gilberg, Reiner; Dickmann, Christian; Schröder, Helmut (2015): IAB-Beschäftigtenbefragung * Projekt "Arbeitsqualität und wirtschaftlicher Erfolg: Panelstudie zu Entwicklungsverläufen in deutschen Betrieben – Personenbefragung". FDZ-Methodenreport, 02/2015 (de), Nürnberg, 40 S.

Schütz, Holger; Gilberg, Reiner; Knerr, Petra; Kellerhoff, Jette; Dickmann, Christian (2016): IAB-Beschäftigtenbefragung * Projekt "Arbeitsqualität und wirtschaftlicher Erfolg: Panelstudie zu Entwicklungsverläufen in deutschen Betrieben" – Personenbefragung. 2. Erhebungswelle. FDZ-Methodenreport, 02/2016 (de), Nürnberg, 43 S.

Schütz, Holger; Knerr, Petra; Metselaar, Carolin; Middendorf, Lena (2017): IAB-Beschäftigtenbefragung * Projekt "Arbeitsqualität und wirtschaftlicher Erfolg: Panelstudie zu Entwicklungsverläufen in deutschen Betrieben" – Personenbefragung. 3. Erhebungswelle. (FDZ-Methodenreport, 11/2018 (de)), Nürnberg, 65 S.

Schütz, Holger; Knerr, Petra; Metselaar, Carolin; Middendorf, Lena (2019): IAB Beschäftigtenbefragung – Projekt „Arbeitsqualität und wirtschaftlicher Erfolg: Panelstudie zu Entwicklungsverläufen in deutschen Betrieben“ – Personenbefragung 4. Erhebungswelle. FDZ-Methodenreport 04/2020 (de), Nürnberg.

Schnell, R. (1997). Nonresponse in Bevölkerungsumfragen. Ausmaß, Entwicklung und Ursachen. Leverkusen: Leske + Budrich, Opladen.

Schnell, R. (2019). Survey-Interviews. Methoden standardisierter Befragungen. 2. Auflage. Wiesbaden: Springer VS.

Schouten B., van den Brakel, J. Buelens, B., van der Laan J., Klausch T. (2013). Disentangling Mode-specific Selection and Measurment Bias in Social Surveys. Social Science Research (42) 1555-1570.

Sen, S., Bricka, S., (2013). Data collection technologies – past, present, and future. In Bhat, C.R. Pendyala, R.M. (Eds.) Travel Behaviour Research in an Evolving World, Lulu Publishers, USA, Chapter 13.

Tourangeau, R. (2004). Survey Research and Societal Change. Annual Review of Psychology, 55(1), 775-801.

Tourangeau, R. (2017). Mixing Models. Tradeoffs Among Coverage, Nonresponse, and Measurement Error. In: Biemer, P.P., De Leeuw, E. Eckman, S., Edwards, B., Kreuter, F., Lyberg, L.E., Tucker, N.C., West, B.T. (Eds.), Total Survey Error in Practice (pp. 115-132). Hoboken, New Jersey: John Wiley & Sons, Inc..

Tschersich, Nikolai; Gensicke, Miriam (2015): Vertiefende Betriebsbefragung „Arbeitsqualität und wirtschaftlicher Erfolg“ 2012 – Methodenbericht. FDZ-Methodenreport 03/2015 (de), Nürnberg.

Tschersich, Nikolai; Gensicke, Miriam (2016a): Vertiefende Betriebsbefragung „Arbeitsqualität und wirtschaftlicher Erfolg“ 2014 – Welle 2. FDZ-Methodenreport 02/2016 (de), Nürnberg.

Tschersich, Nikolai; Gensicke, Miriam (2016b): Vertiefende Betriebsbefragung „Arbeitsqualität und wirtschaftlicher Erfolg“ 2016 – Welle 3. FDZ-Methodenreport 08/2018 (de), Nürnberg.

Tschersich, Nikolai; Gensicke, Miriam (2018): Vertiefende Betriebsbefragung „Arbeitsqualität und wirtschaftlicher Erfolg“ 2018 – Welle 4. FDZ-Methodenreport 03/2020 (de), Nürnberg“ sein.

Vandenplas, C., Loosveldt, G., Vannieuwenhuyze, J.T.A. (2016). Assessing the Use of Mode Preference as a Covariate for the Estimation of Measurement Effects between Modes. A Sequential Mixed Mode Experiment. Methods, data, analyses, 10(2), 119-142.

Vannieuwenhuyze, J., Loosveldt, G., Molenberghs, G. (2010). A Method for Evaluating Mode Effects in Mixed-Mode Surveys. Public Opinion Quaterly, 74(5), 1027-1045.

Vannieuwenhuyze, J.T.A., Loosveldt, G. (2012). Evaluating Relative Mode Effects in Mixed-Mode Surveys: Three Methods to Disentangle Selection and Measurement Effects. Sociological Methods & Research, 42(1), 82-104.

Vannieuwenhuyze, J.T.A., Loosveldt, G., Molenberghs, G. (2014). Evaluating Mode Effects in Mixed-Mode Survey Data Using Covariate Adjustment Models. Journal of Official Statistics, 30(1), 1-21.

Villar, A., Fitzgerald, R. (2017). Using mixed modes in surve research: Evidence from six experiments in the ESS. In: Breen, M.J., (Eds.), Values and Identities in Europe (pp. 259-293). New York: Taylor & Francis Group.

Ye, C., Fulton, J., Tourangeau, R. (2011). Research Synthesis: More Positive or More Extreme? A Meta-Analysis of Mode Differences in Response Choice. Public Opinion Quarterly, 75(2), 349-365.

Imprint

FDZ-Methodenreport 05|2020 EN

Date of publication
12 November 2020

Publisher
Research Data Centre (FDZ)
of the Federal Employment Agency (BA)
in the Institute for Employment Research (IAB)
Regensburger Str. 104
D-90478 Nuremberg

Download
http://doku.iab.de/fdz/reporte/2020/MR_05-20_EN.pdf

Documentation version
LPP1819_DE_v1_dok1, DOI: 10.5164/IAB.FDZM.2005.en.v1

Dataset version
LPP 1819 v1, DOI: 10.5164/IAB.LPP1819.de.en.v1

All publications in the series “FDZ-Methodenreport“ can be downloaded from
https://fdz.iab.de/en/FDZ_Publications/FDZ_Publication_Series/FDZ-Methodenreporte.aspx

Website
https://fdz.iab.de/en.aspx

Corresponding author
Jan Mackeben
Phone: +49 911 179-9294
Email jan.mackeben@iab.de