

LES EFFETS DU MODE DE COLLECTE DES DONNÉES SUR LA MESURE DE L'EMPLOI : UNE COMPARAISON ENTRE LE WEB ET LE TÉLÉPHONE

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Résumé. Les questionnaires par Internet sont de plus en plus utilisés en complément des modes de collecte des données plus traditionnels comme le face-à-face ou le téléphone. Le recours à des enquêtes « multimodes » pose cependant la question de savoir si l'utilisation du web conduit à introduire des biais de mesure qui sont spécifiques à ce mode de collecte. Notre hypothèse est que la magnitude de ce biais dépend fortement de la variable étudiée. En utilisant les données de l'enquête luxembourgeoise sur les forces de travail, qui associe un questionnaire web et un questionnaire par téléphone, nous étudions les différences entre ces deux modes de collecte à partir de données objectives (par ex. le statut dans l'emploi) et subjectives (par ex., la satisfaction avec l'emploi ou avec le salaire). Afin d'isoler le biais induit par le mode de collecte, nous appliquons une méthode d'appariement des données (Coarsened Exact Matching). Les variables qui sont à la base de cet appariement ont été déterminées en utilisant des algorithmes de sélection automatique mais également des éléments théoriques présents dans la littérature. Cette étude indique que les variables objectives ne sont pas affectées par le mode de collecte, tandis que les répondants par web ont tendance à déclarer un niveau de satisfaction inférieur à celui des répondants par téléphone. On voit ainsi que l'effet de mode dépend fortement de la nature de l'enquête et de la variable qui est étudiée.

Mots-clés. Enquêtes en modes mixtes, enquêtes par Internet, effets de mode

Abstract. Web questionnaires are increasingly used to complement traditional data collection in mixed mode surveys. However, the utilization of web data raises concerns whether web questionnaires lead to mode-specific measurement bias. We argue that the magnitude of measurement bias strongly depends on the content of a variable. Based on the Luxembourgish Labour Force Survey, we investigate differences between web and telephone data in terms of objective (i.e. employment status) and subjective (i.e. wage adequacy and job satisfaction) variables. To assess whether differences in outcome variables are caused by sample composition or mode-specific measurement bias, we apply a coarsened exact matching that approximates randomized experiments by reducing dissimilarities between web and telephone samples. We select matching variables with a combination of automatic variable selection via random forest and a literature-driven selection. The results show that objective variables are not affected by mode-specific measurement bias, but web participants report lower satisfaction-levels on subjective variables than telephone participants. Extensive supplementary analyses confirm our results. The present study supports the view that the impact of survey mode depends on the content of a survey and its variables.

Keywords. Mixed-mode surveys, web surveys, mode effects

1. Introduction

Traditional data collection increasingly faces challenges such as declining response rates or less availability of traditional data sources (e.g. fixed-line telephone numbers). In order to deal with these challenges, web questionnaires are increasingly used to complement traditional data collection in mixed mode surveys. However, the increased usage of web questionnaires raises concerns whether collecting data online leads to mode-specific measurement bias, i.e. significantly different responses of the same participants to different survey modes.

Mixed mode effects on employment variables were, for instance, investigated within the framework of a European Statistical System Network (ESSnet) project on data collection for social surveys using multiple modes (Blanke & Luiten, 2014). Varying findings for different variables suggest that the size of mode-specific measurement bias strongly depends on the specific content of a variable. Hence, mode-specific measurement bias needs to be examined separately for different variables. By exploring mixed collection modes on the basis of Luxembourgish Labour Force Survey (LFS) data, we contribute to previous research about employment status and employment related variables. Our contribution is twofold:

First, the present study includes investigations on a battery of variables that is exclusively available in the LFS of Luxembourg. Contrary to typically collected employment variables (e.g. employment status or income), these variables contain subjective information (e.g. wage adequacy or job satisfaction). By investigating on these variables, we provide insights whether measurement bias varies within one survey depending on the type of a variable (i.e. objective vs. subjective). Hereby, we extend previous mixed mode research about employment variables that focuses mainly on objective contents.

Second, we use a different methodological approach compared to previous work about mixed mode effects on measuring employment variables. Most research in this field is based on randomized experiments and re-weighting approaches (Körner and Liersch, 2014; Pohjanpää, 2014; Schouten and van der Laan, 2014). Instead, we use Coarsened Exact Matching in order to harmonize web and telephone samples of the original LFS data after collection (Iacus et al., 2012). This provides us with the possibility to investigate whether a different methodology leads to similar results compared to randomized experiments.

2. Data

We use data of the Luxembourgish Labour Force Survey (LFS). Until 2015, the LFS was conducted via Random Digit Dialing. However, consistently dropping response rates led to the introduction of

a new sampling design in 2015, which is based on a mixed mode data collection consisting of Computer Assisted Telephone Interviewing (CATI) and Computer Assisted Web Interviewing (CAWI). Since 2015, a sample from the Luxembourgish population register is drawn and verified if a phone number of the sampling unit can be found in the official white pages telephone directories online. Sampling units for which a telephone number is available are approached by telephone. Remaining units are approached via an invitation letter containing the internet address where the web questionnaire can be found. As result of this design, participants are not allocated randomly to web and telephone samples.

Figure 1. Cross tabulation of age, sex & nationality for the LFS 2017

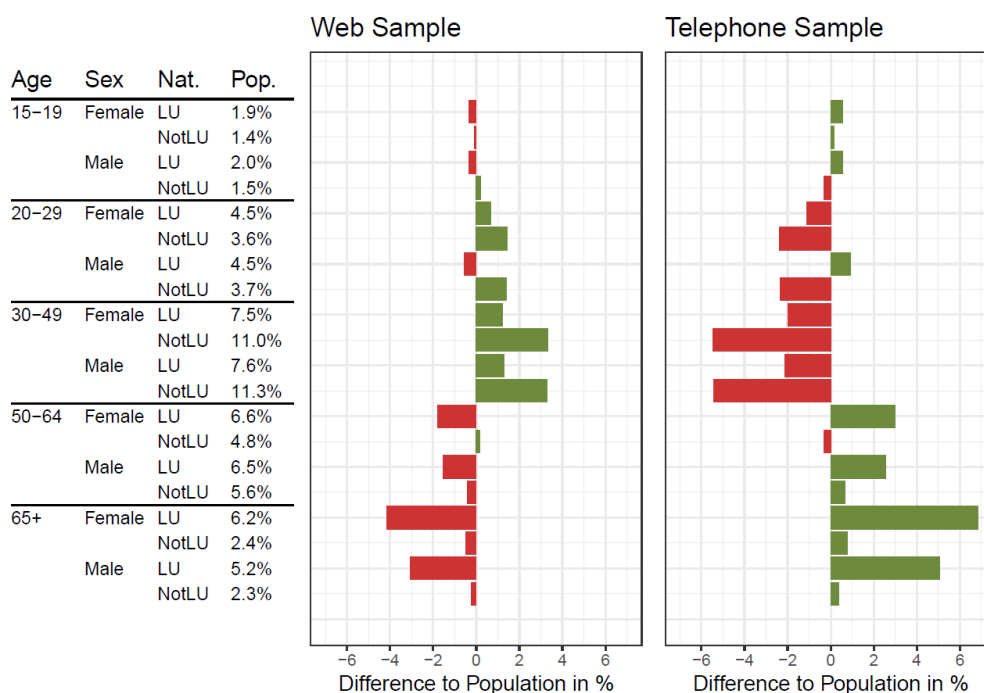


Figure 1 shows a cross tabulation of age, sex, and nationality. The share of the population of 2017 for each group is shown on the right column of the table. The two graphics illustrate weighted differences to the population of web and telephone samples of the LFS 2017. The figure reveals mainly two systematic differences: First, age groups between 20-49 are more often collected by web and age groups 50+ are more often collected by telephone. Second, Luxembourgish people are collected more often by telephone.

Based on a pooled data set of three LFS years (2015, 2016, and 2017), the present study examines whether differences in employment variables are caused by sample composition or mode-specific measurement bias. We investigate on three target variables: employment status, wage adequacy, and job satisfaction. We consider employment status as objective variable (i.e. clear definition

according to the ILO-classification of employment) and wage adequacy as well as job satisfaction as subjective variables (i.e. self-assessment of personal opinions).

3. Method

Differences in auxiliary variables (e.g. sex and age) may influence how respondents of the two groups (web and telephone) report target variables (e.g. employment status). To detect mode-specific measurement bias, we use Coarsened Exact Matching (CEM), a matching method that approximates randomized experiments by reducing dissimilarities in observed variables (Iacus et al., 2012). CEM creates strata using temporally coarsened variables (i.e. with values grouped into substantially meaningful categories) and retains only observations of strata that include at least one observation of both groups.

To find the best matching model, we identify the most relevant variables with a combination of algorithm-based and theory-driven variable selections. First, we conduct an automatic variable selection via random forest in order to find strong predictors for the target variables and for the group assignment (Breiman, 2001). Subsequently, we check theory-based whether the automatically selected matching model includes all important variables and adjust our model accordingly. As result of this process, we use two different matching models for the CEM (employment status: age, sex, nationality, country of birth, marital status, ISCED, interview week, panel wave, questionnaire language, and collection year; wage adequacy and job satisfaction: age, sex, nationality, ISCED, income, NACE, ISCO, questionnaire language, and collection year)

4. Results

Figure 2 illustrates the differences for web and telephone samples before and after CEM for the target variable employment status. The figure displays proportions for the three employment status categories active, unemployed, and inactive. Web and telephone samples pre CEM are represented by the colors dark blue and dark green and web and telephone post CEM are represented by light blue and light green. Proportions of web and telephone samples before matching are very different within the categories. In comparison to the telephone sample, web participants have much more often an active employment status and are slightly more often unemployed. In contrast, web participants are less often inactive than participants of the telephone sample. After CEM, however, differences between web and telephone in the target variable employment status are not statistically significant, indicating that differences before matching are exclusively due to sample compositions of web and telephone data. Employment status is therefore not affected by mode-specific measurement bias.

Figure 2. Mixed mode effects on employment status

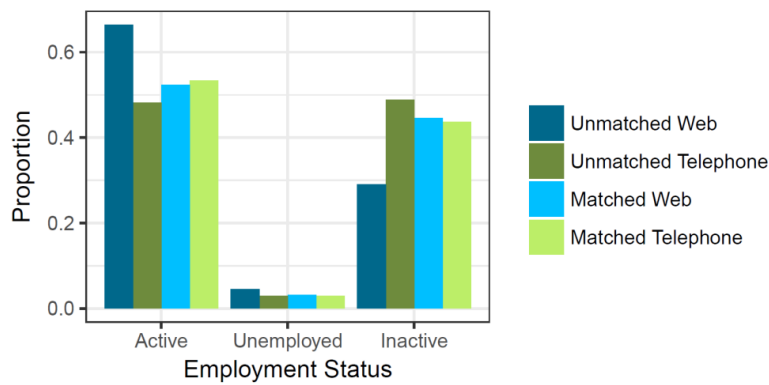
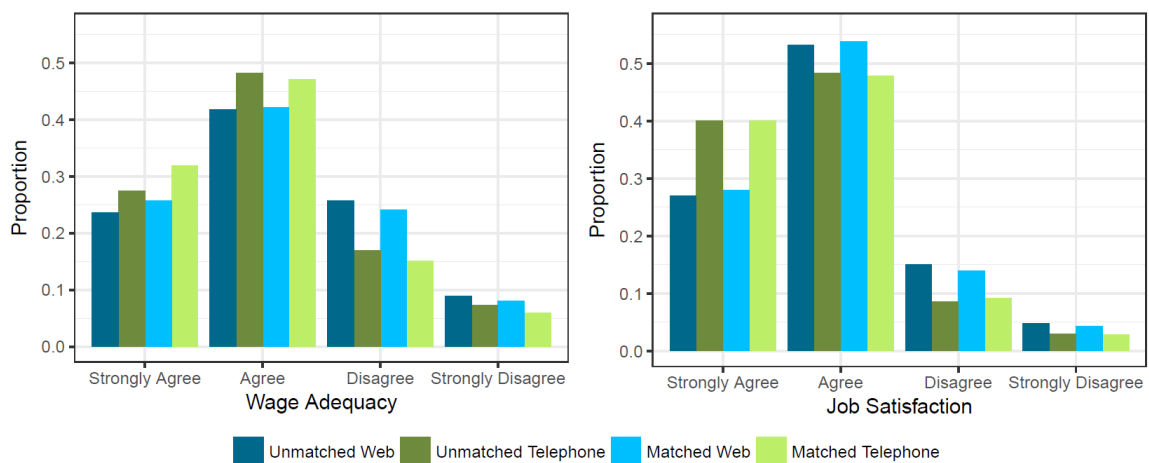


Figure 3 visualizes differences before and after matching for the two target variables wage adequacy and job satisfaction. Both variables consist of the categories strongly agree, agree, disagree, and strongly disagree, with strongly agree for people with the highest wage adequacy or job satisfaction, respectively. Before CEM, web participants perceive their salary less often as fair. Web participants select less often the categories strongly agree or agree and more often disagree or strongly disagree. Similar observations can be made for the variable job satisfaction. Web respondents select less often the category strongly agree and more often the categories agree, disagree, and strongly disagree. In the matched data, these differences remain – Telephone participants still have a higher probability to select positive categories. Wage adequacy and job satisfaction are therefore affected by mode-specific measurement bias.

Figure 3. Mixed mode effects on wage adequacy & job satisfaction



When comparing mode effects of the examined variables, it becomes noticeable that employment status does not suffer from mode-specific measurement bias, whereas wage adequacy and job satisfaction do. The main difference between those variables is the variable's objectiveness.

Employment status is relatively stable and does not depend on personal opinions of the respondent. Wage adequacy and job satisfaction, in contrast, are very subjective.

We assume that social desirability effects have a larger impact on subjective variables. It might be unpleasant for respondents to reveal dissatisfaction with their employment situation to a real person and, hence, they might present their employment situation as too positive. Furthermore, the thinking process might be disturbed by an interviewer on the telephone. The results therefore suggest that objective variables are less affected by mode-specific measurement bias than subjective variables.

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