

What do the business tendency surveys measure, and what is their information content?

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Abstract

Business and consumer surveys (BCS), or business tendency surveys (BTS), are designed to obtain qualitative information from businesses which can be provided with relatively little effort, so that they impose a low burden on the respondents. The ease of response is, however, connected with potential subjectivity which can be affected by panel conditioning effects. In this paper we review the evidence for panel conditioning, which is almost exclusively from household surveys. We report evidence from a follow up survey that a substantial proportion of respondents does respond using subjective judgement. Then we outline a state space modelling approach to identification of the rotation group bias focussing on the differences between early responses and a stable longer term response.

Key Words: Business Tendency Survey, rotation group bias, panel conditioning

1. Literature Review

1.1 Business Tendency Surveys

Business Tendency Surveys, or Business and Consumer Surveys, are a favourite source of information for economists, analysts and journalists. They present primary information about the mood of businesses and indicate the development of the national economy. Results from the Business and Consumer Surveys can identify turning points in the economy (Claveria, Monte & Torra, 2016). Marek, Hronová & Hindls (2019) add that they help with early estimation of the national economy or specific sectors within it. The European Commission publishes the Flash Consumer Confidence Indicator a week before publishing the full Business and Consumer Surveys results (European Commission, 2020). Unfortunately, analysts do not use these results more frequently (Marek, Hronová & Hindls, 2019).

The first Business and Consumer Survey started in the 1920s in the United States. In Europe, it was later – in 1949 in Germany and 1951 in France and Italy (Marek, Hronová & Hindls, 2019). The Joint Harmonised EU Programme of Business and Consumer Surveys began with a survey in the manufacturing sector in 1962. The construction sector and an investment survey in the manufacturing sector were added in 1966, a consumer survey was added in 1972 and retail trade in 1984. The service sector was the last one – in 1996 (European Commission, 2019). In Czechia, the Czech Statistical Office (CSO) started

tendency surveys in industry, construction and trade in 1993, followed by a consumer survey in 1998. The trade sector was the most recent addition in May 2002.

Confidence indicators and Economic Sentiment Indicators are the main outputs from the Business and Consumer Surveys. These confidence indicators describe the current economic situation in the economy and expectations about future development – not only for overall activity but also about specific economic variables (such as sales, employment or costs). Respondents do not quantify the changes, but only choose from the three options: growth (better) – no change – decrease (worse), so the collected data are qualitative. We analyse four economic sectors: industry, retail trade, construction and selected services, and consumers (Czech Statistical Office, 2020). Because the survey is monthly, there is a lot of data describing the mood and opinions of companies.

Kozel (2006) mentions in his book that we cannot use conventional statistical techniques for Business and Consumer Surveys. It is necessary to include mostly companies that cover a significant part of the specific sectors of interest (industry, construction, selected services and trade). Outputs must conform to the objectives of the analysis: short-term forecasts (production, employment, investment, prices), outlining firms' expectations for the near future or identifying factors differentiating the business cycle. Marek, Hronová & Hindls (2019) found advantages in the simplicity and speed of the survey, and the low demands on monitoring and calculation. They mention the subjectivity of the responses as a disadvantage. The challenge of qualitative surveys is in another area: the speed of the survey, and flexible and sometimes vague formulation of questions, mean that the nature of the answer does not always correspond to the wishes of the survey-taker (Marek, Hronová & Hindls, 2019). Jílek, Pecáková & Vojta (2005) warn that roughly 60% of Czech companies choose “no change” answers in the Business and Consumer Survey questionnaire and recommend using Business Surveys outputs only as additional information. This suggests that respondents may be making a response that requires little cognitive effort, and this may be conditioned by their time in the survey. Clinton (2001) found that there is no panel conditioning when a respondent answers easy questions in household surveys. Toepoel, Das and van Soest (2009) confirm this knowledge because they find more significant panel conditioning effect during responding to difficult questions. In business surveys the information on panel conditioning is very sparse, but recently Altig et al. (2021, in press) find little effect in the Survey of Business Uncertainty. Binder (2019), however, does find an effect on consumers in an inflation expectations survey.

Liu *et al.* (2011) used a matched dataset with tendency survey data linked to quantitative data from official surveys in the United Kingdom (UK), and found that there was little consistency in the information from the two sources. The tendency survey is designed to measure something in the future, but it is possible that (i): respondents are conditioned by what is happening at the time of data collection so that their responses are more influenced by the current situation; (ii) the time for data to be collected, processed and published causes a lag in published information, so that the survey actually measures something in the recent past.

1.2 Panel conditioning in the surveys

Panel conditioning might be particularly influential in tendency surveys where responses are based on opinions rather than numeric information. RGB has been postulated for business surveys by Srinath (1987) and Sigman & Monsour (1995) but has not been assessed objectively in a real example (Smith & Yung, 2019).

Waterton & Lievesley (1989) list reasons why the conditioning can occur:

- Changing behaviour or attitudes by raising consciousness
- Freezing attitudes
- More honest reporting of socially desirable behaviour
- Improved understanding of the interviewing rules
- Higher motivation
- Lower motivation.

Longitudinal surveys are a beneficial source of data for studying changes over time (Halpern-Manners, Warren & Torche, 2017). In our paper, we will focus on panel conditioning. This theme is popular in sociological and psychological surveys, but, with the exception of the investigation by Altig et al. (2021, in press), we have not found articles documenting panel conditioning in business surveys. Surveys collect relevant data over several periods and help with the analysis of social phenomena or understanding social processes (Yan & Eckman, 2012). Survey researchers say that a respondent's opinion about the survey is crucial to the trustworthiness of the answer (Warren & Halpern-Manners, 2008).

Halpern-Manners & Warren (2012) investigate the magnitude of 'panel conditioning' or 'time in survey' biases for key labour force questions in the monthly Current Population Survey (CPS). They recommend using shorter intervals between the survey occasions. Respondents can feel embarrassed, for example, when they are unemployed, and therefore report that they are not in the labour force; when we have more information, we can eliminate these data. They compare successive incoming cohorts of CPS respondents concerning within-person changes over time. Their results – about panel conditioning – are stable after eliminating the possibility of mode effects. Drew, Flood & Warren (2014) confirm that the bias arises from changing statements about attitudes, behaviours or statuses. They point out that panel conditioning can have an impact on the estimation of unemployment and labour force participation rates – the Bureau of Labor Statistics also warns users about these effects. Toepoel, Das & Soest (2009) add that the panel conditioning is found in less-known topics (the questions where the respondent does not know the meaning of a particular term or does not know the information). Therefore it is essential to be careful during the interview, and give respondents more information about the subject.

Halpern-Manners, Warren & Torche (2014) say that panel conditioning effects are strongest in the early waves of a panel survey (because the respondent does not have a lot of information about the survey questions) and wane over time (because the respondent knows the questions, protocol and interview). Bailer (1989) warns that: *Respondents learn that some responses mean additional questioning, so they may avoid giving certain answers*. Halpern-Manners, Warren & Torche (2014) mention the average treatment effect, which can describe variation in panel conditioning effect across different sociodemographic groups. Kruger, Mas & Niu (2017) define two primary sources which have an impact on bias: nonresponse and redesign effects.

Authors use a lot of different methods for analysing panel conditioning, for example, probit models (Toepoel, Das & Soest, 2009), logistic regression models or multinomial regression model (Yan & Eckman, 2012), multiplicative models to estimate rotation group bias (Krueger, Mas & Niu, 2017), nonparametric test (Das, Soest & Toepoel, 2011) etc.

1.3 Panel conditioning and panel attribution

Das, Soest & Toepoel (2011) write in their article that many analysts do not distinguish between *attrition* and *panel conditioning*. They only calculate the total bias, which takes account of both. They found panel conditioning in knowledge questions, but there is no panel conditioning in questions about attitude, behaviour or future expectations (again in household surveys).

Bergmann & Barth (2018) say that there are two problems in empirical studies: non-random attrition and panel conditioning. Sturgis, Allum & Brunton-Smith (2009) state that all errors are covered by the terms 'panel conditioning' or 'time in sample bias' in research about panels, and they mention the impact on respondents' answers of responding in the previous waves. According to Das, Toepoel & van Soest (2011), staying in the survey helps with error reduction. As a disadvantage, they mention that respondents have a strategy for responding to the answers and how to say 'no' to the interviewer. Bergmann & Barth (2018) describe the mechanism of panel conditioning in their paper. Mentioned mechanisms (see Fig. 1) can influence the information processing because the repetition produces stronger attitudes. Respondents' answers are more stable and may also affect the response behaviour more (Bergman & Barth, 2018).

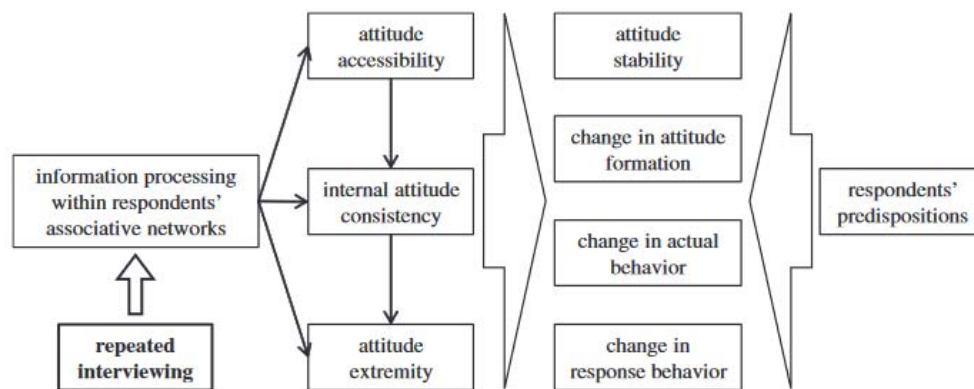


Figure 1: Framework for analysing panel conditioning (Source: Bergmann, Barth (2018))

Therefore, Bergmann & Barth (2018) describe the consequences of panel conditioning. They mention stability. When the respondent answers repeatedly, it may change the formation of attitudes in respondents' behaviour.

2. Data and methodology

2.1 Data

In this paper, we will use outputs from Business Survey from the Czech Republic. In the Czech Republic, respondents are under an obligation to fill in the questionnaire for the Czech Statistical Office. Every year, companies get a letter with the reporting obligation. The Czech Statistical Office (CZSO) is responsible for the collection (in the industry, construction, trade, and selected services sectors), analysing the data and publishing the results. We do not consider consumers in this paper. It is important to say that the response rate is very high: 95% in the industry sector, 75% in the construction sector, 85% in the trade and 80% in the selected services (including the banking sector). Business and

Consumer Surveys – as we said in the beginning – are harmonised in the Joint Harmonised EU Programme of Business and Consumer Surveys. Fortunately, the questionnaires are stable for a long time. Therefore, we have a stable time series. The questionnaires in the industry and construction sectors have been the same for ten years, and in trade for around fourteen years.

2.2 Survey on survey and the average run length

The Business and Consumer Survey results are qualitative because they choose from a scale (mainly three-point). The CZSO undertook a follow up survey to gather this information, which we call the “survey on survey” (SOS).

The pandemic confirms that we need quick information about the current and future business development for the correct selection and application of models. But we must understand the primary data - what the answers from the respondents mean, what they tell us, what they can predict. Before coronavirus, we opened the discussion about the implementation of a follow-up survey (the “survey on survey” or SOS) in the field of business surveys, which are conducted in the Czech Republic according to the methodology of the European Commission. The survey followed the primary analytical outputs and practical experience of experts. The survey was conducted in four basic sectors: industry, construction, trade and selected services.

The first wave of SOS was launched at the end of 2019 when information was collected from respondents in the industrial sector. The latest findings from the respondents came at the beginning of 2021. The questionnaires were preceded by a debate with the most important data users - representatives of the Czech National Bank, ministries, commercial banks and prominent analysts, who often work on business surveys. The respondents in the Business and Consumer survey sample (in industry in 2019, trade, selected services and construction in 2020) received a voluntary questionnaire asking about how respondents gather the necessary information and make decisions about the answers. They often choose from the options, but they were given space for their own comments. After follow-up activity the SOS achieved an overall response rate of 27%.

The information obtained may not only help analysts to improve the survey's predictive ability but also respondents. CZSO can make available the methodology for filling in the questionnaire or better formulate the question asked, to which they answer every month. In the following text, the main outputs will be presented. Only the primary results are mentioned, and we will work with the data in the future in more detail.

From the SOS, we know that more than 75% of respondents are satisfied with the three-point answer scales: industry – 87.1%, construction – 86.6%, trade – 75.3% and selected services – 77.2%. It is crucial to find out how respondents decide on the response for their company's future situation (employment, sales or demand – independent of the sector). The respondents in the construction sector use accounting sources the most; respondents prefer real numbers over subjective feelings. On the other hand, respondents in the trade and services more frequently fill in the monthly questionnaire based on their subjective interpretation.

Table 1: Using sources across the sectors (%)

	<i>Industry</i>	<i>Construction</i>	<i>Trade</i>	<i>Services</i>
<i>Order books (sale forecast)</i>	47.8	63.6	44.9	28.6
<i>Another accounting source</i>	21.1	7.1	5.8	19.9
<i>Subjective feeling</i>	31.1	29.3	49.3	51.5

Ptáčková, Štěpánek & Hanzal (2018) calculate that respondents are more sensitive about the future development of employment and sales/production. They use two metrics with the following definitions:

- mean to first*, $MTF_{t,i,c} \stackrel{\text{def}}{=} \text{an average of values of indicator } i \text{ linked to the consecutive months } t, t+1, t+2, \text{ respectively, recorded by company } c, \text{ divided by the value of indicator } i \text{ linked to month } t, \text{ recorded by company } c, \text{ where } t \text{ stands for an ordinal index of the month and } i \text{ stands for one of the indicators of interest, } i \in \{\text{employment, sales}\}.$
- last to first*, $LTF_{t,i,c} \stackrel{\text{def}}{=} \text{the value of indicator } i \text{ linked to month } t+2, \text{ recorded by company } c, \text{ divided by the value of indicator } i \text{ linked to month } t, \text{ recorded by company } c, \text{ where } t \text{ stands for an ordinal index of the month and } i \text{ stands for one of the indicators of interest, } i \in \{\text{employment, sales}\}.$

These ratios are essential for finding a significant threshold where respondents do not choose 'no change' but 'growth/decrease'. Using these metrics, they find a 10% (mean to first metric) or 20% (last to first metric) significant ratio for employment. However, for the sales, this ratio is 60% (mean to first metric) or 70% (last to first metric). In SOS, respondents were asked what the significant percentage change is from their point of view which would lead them not to choose 'no change'. Table 2 shows the effect on output. In production and construction sectors, the modal category is 'more than 10%'. In the services and trade, respondents choose mainly the group 'more than 5%'.

Table 2: Significant change across the sectors (%)

	<i>Less than 1%</i>	<i>More than 1%</i>	<i>More than 5%</i>	<i>More than 10%</i>	<i>More than 25%</i>	<i>More than 50%</i>
<i>Production (industry)</i>	3.4	5.3	33.7	41.8	15.4	0.4
<i>Building activity</i>	2.3	3.8	30.0	44.4	16.5	3.0
<i>Business activity/sales (trade)</i>	3.8	10.5	40.6	31.6	11.3	2.2
<i>Demand/Turnov er (services)</i>	4.7	6.3	34.0	33.5	15.7	5.8
<i>Prices (services)</i>	9.3	15.8	32.8	30.6	7.1	4.4

Table 3 asks the same question, but connected to employment in the next three months. Across all sectors, respondents are more sensitive about employment development in the

next three months. A reported change means a decrease or increase in the number of employees by more than 5% most frequently.

Table 3: Significant change for the employment task across the sectors (%)

	<i>Less than 1%</i>	<i>More than 1%</i>	<i>More than 5%</i>	<i>More than 10%</i>	<i>More than 25%</i>	<i>More than 50%</i>
<i>Industry</i>	7.2	15.5	43.5	27.0	6.8	0.0
<i>Construction</i>	5.3	15.8	44.4	23.3	8.2	3.0
<i>Trade</i>	15.3	20.2	36.3	20.2	4.0	4.0
<i>Services</i>	8.0	18.7	34.2	28.3	5.4	5.8

We also asked about the respondent's post across the analyzed sectors (see Table 4). Respondents could choose multiple options for this question, so the sum of the percentages is not 100%. The responding person also fills in the questionnaire mainly in the Business survey (industry – 84.7%, construction – 82.9%, trade – 92% and selected service 91.7%). The answers are beneficial for us because we know that the information is relevant and of high quality.

Table 4: Characteristics of the respondent across sectors (%)

	<i>Industry</i>	<i>Construction</i>	<i>Trade</i>	<i>Services</i>
<i>Assistant</i>	1.0	6.3	11.6	5.0
<i>Person responsible for reporting</i>	37.1	17.6	26.8	33.7
<i>Head of the relevant department of lower management</i>	8.1	10.6	8.0	6.5
<i>Head of the relevant department of higher management</i>	23.3	16.2	15.2	11.6
<i>Director</i>	12.4	14.8	15.2	11.6
<i>Statutory representative</i>	10.0	24.6	21.7	11.1
<i>Member of the board</i>	5.7	6.3	5.8	6.0
<i>Employee of an external company</i>	1.0	1.4	4.3	1.5
<i>Other</i>	10.5	4.9	5.8	1.0

We consider how long the respondents fill in the same answers in the monthly questionnaire. We choose the same two key variables: turnover/sales/demand/production/building activity (depending on the sector) and employment. We use data from January 2012 to December 2020, and in Table 5, show the average run length, which means how long the respondent fills in the same answer (non response is treated by carrying forward the last known value, which slightly inflates the estimates). We consider this fact because long runs may demonstrate poorer outputs from the Business Tendency Surveys.

Table 5: Average run length of the same answer choice (months) across the sectors (x = not applicable)

	<i>Employment</i>	<i>Demand</i>	<i>Production</i>	<i>Sales</i>	<i>Building activity</i>
<i>Industry</i>	10.46	8.09	8.17	x	x
<i>Construction</i>	8.44	10.68	x	x	6.71
<i>Trade</i>	11.09	x	x	5.47	x
<i>Services</i>	9.43	x	x	8.07	x

2.3 State Space Model for Rotation Group Bias

We are further interested in whether businesses which are required to join the panel for the BCS have different behaviour initially from businesses which have been reporting for a longer period. We hypothesise that such a start-up effect is the most likely manifestation of rotation group bias in short period business surveys, and that this may be more visible in tendency surveys which are based on opinions (notwithstanding the findings of Das et al. (2011) that easy questions are less susceptible to conditioning effects in household surveys; it is perhaps an interesting question whether BCS questions are “easy”, though they certainly require less effort to complete than factual turnover/employment surveys which require records to be accessed).

To investigate the response process, we set up suitable state space models (Durbin & Koopman 2012) for ‘panels’ from the survey. We treat businesses responding for the k th time, $k = 1, 2, \dots, K-1$ as the k th wave, and the K th wave as all remaining periods. We therefore assume that the panel conditioning (if any) in responses is stable from the K th occasion. We consider small values for K . The Czech BCS use a panel design where the same businesses are included each month (without rotation). The numbers of new businesses joining the panels are therefore rather small, so it is challenging to detect differences. We also examine the effect on estimates derived from the Monthly Business Survey (MBS) in the UK, which includes only factual (and not tendency) questions. The conditioning effect on factual questions may be less, but it is interesting to contrast these survey types. The MBS operates a rotating panel design, so new businesses join the sample each month, and therefore the amount of data available is much larger.

We now construct a state space model for the first wave y_{1t} and the remaining waves y_{rt} . We assume that these both measure the same underlying population parameter, which we model with a linear growth model parameterised by a level μ_t and trend v_t . We also include a parameter λ_t which measures the difference between the wave 1 response mean and the mean of the other responses. We also include simple seasonal factors. We include the survey errors for the first period (1) and for the rest (r).

$$\begin{bmatrix} y_{1t} \\ y_{rt} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 & 0 & \dots & 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 & \dots & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \mu_t \\ \nu_t \\ s_t \\ s_{t-1} \\ \vdots \\ s_{t-10} \\ \lambda_t \\ \sigma_{1t} \\ \sigma_{rt} \end{bmatrix}$$

In order to determine the state equations, we make some assumptions about the relationship between σ_{1t} and σ_{2t} in consecutive periods, due to the panel structure of the surveys with many common businesses:

- σ_{1t+1} and σ_{1t} are unrelated (because in each period the first-time businesses are a new group, so there is no overlap), so $\sigma_{1t+1} = \eta_t^{\sigma_1}$ (that is, the differences from period to period are only due to the variation in this parameter)
- $\sigma_{2t+1} = \rho_1 \sigma_{1t} + \rho_r \sigma_{rt} + \eta_t^{\sigma_r}$

Incorporating these into the state equation gives:

$$\begin{bmatrix} \mu_{t+1} \\ \nu_{t+1} \\ s_{t+1} \\ s_t \\ s_{t-1} \\ \vdots \\ s_{t-9} \\ \lambda_{t+1} \\ \sigma_{1(t+1)} \\ \sigma_{r(t+1)} \end{bmatrix} = \begin{bmatrix} 1 & 1 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & -1 & \dots & -1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & \dots & 0 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & & & \ddots & & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \dots & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & \rho_1 & \rho_r \end{bmatrix} \begin{bmatrix} \mu_t \\ \nu_t \\ s_t \\ s_{t-1} \\ s_{t-2} \\ \vdots \\ s_{t-10} \\ \lambda_t \\ \sigma_{1t} \\ \sigma_{rt} \end{bmatrix} + \begin{bmatrix} \eta_t^\mu \\ \eta_t^\nu \\ \eta_t^s \\ \eta_t^\lambda \\ \eta_t^{\sigma_1} \\ \eta_t^{\sigma_r} \end{bmatrix}$$

We aim to fit this model on Czech and UK data to compare estimates of the RGB. Unfortunately the results from this procedure are not yet available.

3. Conclusions

The follow-up survey of the Czech Business Tendency Survey successfully provided information on the thought processes used by respondents. In some sectors the modal choice of evidence used to complete the questions was the business's records, but in other sectors subjective feelings were most frequent. This indicates a mechanism through which panel conditioning might operate, and we review the different evidence for panel conditioning, which is essentially all from household surveys. We propose a state space model for the analysis of panel conditioning in a business survey, focusing on changes in

the first few response occasions, which we hypothesise to be the key ones for any difference. In long rotation designs or panel surveys, we suspect that the time in sample effect will become stable after several periods.

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